

TOLLING AGREEMENT

THIS AGREEMENT is made and effective as of June 25, 1991, by and between ALBRIGHT & WILSON AMERICAS INC., a Delaware corporation, with its principal office at 100 Lakeridge Parkway, Ashland, Virginia 23005 ("A&W") and CEDAR CHEMICAL CORPORATION, a Delaware corporation with its principal office at 24th Floor, Clark Tower, 5100 Poplar Avenue, Memphis, Tennessee 38137 (hereinafter "Cedar").

WITNESSETH:

WHEREAS, A&W has developed and currently possesses a process which it represents to be capable of producing Di 2-ethylhexyl phosphoric acid referred to as DEHPA (the "Product") and is desirous of having the Product manufactured for it according to such process;

WHEREAS, the parties entered into a Secrecy Agreement dated June 21, 1991 (the "Secrecy Agreement") which governs the terms under which A&W shall disclose confidential and proprietary information and to the extent consistent with and supplementary to this agreement, the Secrecy Agreement is incorporated herein by this reference;

WHEREAS, Cedar has personnel and some of the equipment necessary for the manufacture of the Product and is desirous of manufacturing the Product for A&W in accordance with said process developed by A&W; and

WHEREAS, the parties contemplate that Product will be produced in at least two Campaigns (defined below) and may be produced in two phases, Phase I and Phase II, subject to the terms and conditions set forth herein.

NOW THEREFORE, it is agreed as follows:

1. DEFINITIONS

For purposes of this Agreement, the following terms shall have the meaning assigned thereto:

1.1 "Phosphorus trichloride" shall mean Raw Material meeting the specifications set forth in Exhibit A attached.

1.2 "2-ethylhexyl alcohol" shall mean Raw Material meeting the specifications set forth in Exhibit A attached.

1.3 "Raw Materials" shall mean phosphorus trichloride, 2-ethylhexyl alcohol, and those other raw materials required for the production of Product as identified in Exhibit A attached.

"P" Product Meeting Specifications  
"R" Any Other Product Made

1.4 "Equipment" shall mean the equipment, improvements and alterations made to Cedar's number 10 production unit at the Plant (hereinafter defined) identified in Exhibit "I," installed for the purpose of enabling Cedar to produce Product hereunder during Phase I.

1.5 "Plant" shall mean Cedar's chemical manufacturing facility at Highway 242, West Helena, Arkansas.

1.6 "Product" shall mean Di 2-ethylhexyl phosphoric acid (DEHPA), the specifications for which are set forth in Exhibit B attached.

1.7 "Intermediates" and "By-Products" shall mean either Di (2-ethylhexyl) phosphorochloride, Bis (2-ethylhexyl) hydrogen phosphite, 2-ethylhexyl chloride or hydrochloric acid or all of these, as the Agreement and the context requires.

1.8 "Phase I Equipment" shall mean any equipment, improvements or alterations necessary to produce the product.

1.9 "Phase II Equipment" shall mean all equipment, improvements or alterations necessary to increase production in Phase II, as set forth herein.

1.10 "Campaign" shall mean the continuous production of Product up to the quantity stated herein.

## 2. TERM

The initial term of this Agreement shall commence and be effective as of June 25, 1991 and shall terminate on the earlier of December 31, 1992 or the date on which production of Product in the second Campaign is completed; provided, however, in no event shall this Agreement be terminated prior to the manufacture of 1,800,000 pounds of Product. If A&W wishes to extend the term of this Agreement, it shall notify Cedar not later than September 30, 1992 at which time the parties will negotiate in good faith to reach agreement on fees and other terms applicable to the extended term.

## 3. METHOD OF OPERATION

3.1 A&W shall furnish Cedar with, or cause it to be furnished with Raw Materials in amounts sufficient to enable Cedar to produce the specified quantities of the Product set forth in A&W's requisition or purchase order from time to time submitted; provided that Cedar shall supply all nitrogen required at its cost and all chlorine required at a price of \$35.00 per ton during the Initial Term. Cedar will manufacture approximately 1,800,000 pounds in the first Campaign (defined above) followed by a second Campaign which shall consist of not

less than 2,000,000 pounds nor more than 4,000,000 pounds which amount will be based upon A&W's good faith estimate to be given to Cedar no later than December 31, 1991. The second Campaign shall commence immediately following the first Campaign at the same production rate as Phase I; however, if A&W decides to commence Phase II, the second Campaign will be interrupted in order to make the Phase II improvements to the plant and equipment. Cedar agrees to provide A&W no later than November 15, 1991 with a not to exceed estimate of the cost of modifications to Cedar's plant, a downtime estimate and a not to exceed schedule for completion of the work necessary to commence Phase II and A&W will notify Cedar of its decision to commence or not to commence Phase II no later than December 15, 1991. Phase II of production shall be carried out at an anticipated rate of 22,000 pounds of Product per day.

3.2 Phase I of Product production will commence promptly following completion of the installation of Equipment, issuance of all such amended permits required by state or federal governmental authorities in order for Cedar to perform hereunder, which permit Cedar shall make its best efforts to obtain as promptly as possible and successful start up of the modified production unit referred to herein, and shall continue to produce Product thereafter. During the first Campaign, Cedar shall produce 1,800,000 pounds of Product and, during the second Campaign Cedar shall produce the amount ordered by A&W subject to the limitations in section 3.1 above. During Phase I, Cedar will make its best efforts to produce at least 15,000 pounds of Product meeting the specifications referred to herein each day from Raw Materials meeting the specifications referred to herein supplied by A&W. In carrying out its duties hereunder, Cedar shall adhere to A&W's process for production of Product, identified in Exhibit E (the "Process") as same may be modified from time to time by written agreement of both parties, and shall make its best efforts to meet the Raw Material consumption standards identified in Exhibit F.

3.3 Cedar shall provide at its Plant, receiving, storage, production and delivery facilities and services necessary to fully perform its obligations hereunder which shall include, without limitation, facilities sufficient for storage of up to REASONABLE pounds of Product; production facilities containing the Equipment and, if applicable, the Phase II Equipment referred to herein, and sufficient technical and administrative personnel and laboratory facilities to enable it to perform hereunder. Cedar shall preserve and protect the Raw Materials and the Product from contamination, loss, theft, damage or destruction, and from attachment, levy, distraint or any other actions by Cedar's creditors, while in Cedar's possession. Cedar shall fully account periodically for all Raw Materials, work in process and the Product in its possession; shall keep such records relating thereto as A&W may reasonably request; and shall

furnish A&W with a certificate of insurance that conforms with Cedar's undertakings described in Section 4 below. At the end of each Production Campaign, unused Raw Materials supplied by A&W shall be returned to and accepted by A&W at A&W's cost.

3.4 Raw Materials shall be accepted according to Cedar's ordinary business practices. Cedar shall promptly advise A&W's designated representative of any defects in any such Raw Materials or failure of any of the Raw Materials to conform with said specifications. A weight ticket and certificate of analysis shall be provided by A&W, or its supplier, and by Cedar, or its supplier, for every shipment of Raw Materials. On any Raw Materials imported, Cedar agrees to provide a copy of the bill of lading, a notation as to the port of entry and a certification made to customs that the import does not violate the provisions of the Toxic Substances Control Act. A&W covenants with Cedar that no Raw Materials imported hereunder shall violate the provisions of the Toxic Substances Control Act and agrees to indemnify Cedar and save it harmless with respect thereto.

3.5 Cedar shall ship the Product in accordance with A&W's instructions and at A&W's cost. In connection with each such shipment, Cedar shall prepare a bill of lading in standard form and, immediately after a shipment is made, Cedar will send, by telecopy, a copy of such bill of lading to A&W.

3.6 Each party shall be liable for demurrage to the extent charges therefor result its errors or omissions.

#### 4. TITLE AND RISK OF LOSS

4.1 Title to the A&W Raw Materials delivered by A&W, or its supplier, to Cedar, shall at all times remain solely in A&W; the Raw Materials and the Product shall be segregated from other materials and goods of Cedar and Cedar shall take such steps, including the filing of financing statements centrally and locally indicating A&W's interest in the Raw Materials, the Product in process, the Product, and the proceeds of the foregoing and/or the posting of signs indicating A&W's interest in the foregoing.

4.2 The risk of loss of Raw Materials delivered by A&W or its suppliers shall remain with A&W until delivery of such Raw Materials to the Plant and Cedar's acceptance thereof. Cedar shall not be deemed to have accepted Raw Materials for which it provides notification to A&W in accordance with Section 3, that such Raw Materials fail to meet the specifications set in Exhibit A hereto. Cedar shall also bear the risk of loss on all Product in process and the finished Product while in its possession and control unless and to the extent loss or liability results from A&W's sole negligence. Cedar shall not be liable for economic incidental or consequential damages, such as business

interruption or lost profit damages, incurred by A&W due to a loss of Raw Materials, Product in process or Product. In the event of loss or liability arising under this section, Cedar agrees to pay A&W for such loss or liability within 30 days of A&W's invoice therefore, or issue a commensurate credit against fee owed by A&W to Cedar under this tolling agreement as long as such credit does not result in a credit balance being carried by A&W. Cedar shall maintain insurance in appropriate form and amount in accordance with industry standards covering the Raw Materials, the Product in process and the Product. Cedar shall provide A&W with a certificate evidencing its insurance coverage naming A&W as additional insured on liability coverage and as loss payee on property damage to the extent of A&W's interest in such property, and providing that A&W will be notified thirty (30) days prior to cancellation of or an adverse change in Cedar's insurance coverage.

4.3 The risk of loss of the Product produced hereunder shall be A&W's on and after each shipment leaves the Plant.

## 5. PRODUCT QUALITY

5.1 Cedar shall make its best efforts to produce Product during Phase I to meet the specifications set forth in Exhibit B. Beginning with the effective date of the parties' amendment to this Agreement following the Qualification Run referred to in Section 6, Cedar shall warrant the Product produced hereunder to meet such agreed specifications. CEDAR MAKES NO OTHER WARRANTY WITH RESPECT TO THE PRODUCT, INCLUDING WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE AND NONE SHALL BE IMPLIED. To determine whether Product produced hereunder meets the specifications attached hereto at Exhibit B or any agreed revised specifications:

(i) Cedar shall draw two (2) samples from each batch in accordance with procedures specified by A&W and agreed to by Cedar. Each of said samples shall be marked with Cedar's name and batch number.

(ii) Cedar shall test one (1) of the batch samples in accordance with analytical methods and procedures agreed upon by Cedar and A&W. If the batch conforms to specifications set forth in Exhibit B, it will be approved for shipments pursuant to this Agreement.

(iii) Cedar will seal the tested sample and hold same for two (2) years, at which time the samples may be disposed of, unless A&W instructs Cedar that it intends to pick up the samples or unless otherwise required by law. In any event, samples may be delivered by Cedar to A&W at A&W's cost upon termination of this Agreement. The untested duplicate sample shall be expeditiously sent (at A&W's expense) to A&W

at 2151 King Street Extension, Charleston, SC 29405, Attn: William Stewart, or as otherwise specified in writing. Except as specified herein, Cedar shall prepare and handle such samples at no additional expense to A&W. Such samples shall be analyzed by A&W to insure that the Product produced by Cedar meets the specifications set forth in Exhibit B. A&W shall notify Cedar of the results of such analysis not later than thirty (30) days following its receipt of each shipment of Product hereunder.

(iv) If a batch does not conform to specifications, Cedar shall immediately notify Peter Hastings or his designee, at Albright & Wilson Americas, 100 Lakeridge Parkway, Ashland, Virginia 23005 by telephone (804) 550-4348 and mutually agree to a course of action. Cedar shall bear all costs of disposal of a batch which fails to meet specifications agreed to by Cedar unless caused by the negligence or fault of A&W.

(v) A Certificate of Analysis will be sent with each shipment of the Product with a copy to A&W.

5.2 In case of a conflict between the results of the tests to be performed by A&W and Cedar as described in this Section 5, an independent testing laboratory to be agreed upon in good faith by Cedar and A&W shall make the final determination as to whether or not the Product produced meets the specifications set forth in Exhibit C or any revised specifications.

5.3 In the event that the tests referred to in this Section 5, above demonstrate that a shipment of the Product manufactured hereunder does not conform to the specifications agreed to by the parties hereunder, and such failure to conform is the result of Cedar's failure to correctly follow A&W's process or other failure to perform in accordance with this Agreement, Cedar, at its expense, shall produce a replacement batch that does conform with such specifications. In such case, Cedar shall pay for the Raw Materials to produce the conforming batch and A&W shall pay the normal fees as set forth in Section 6 below for the replacement batch except to the extent it has paid the fees for the non-conforming batch.

## 6. PRODUCTION AND FEES

6.1 Cedar shall produce Product hereunder utilizing the Phase I Equipment (or if applicable, the Phase II Equipment) as shall have been approved by A&W, in accordance with A&W's Process attached hereto as Exhibit E as same may be modified from time to time by written agreement of both parties hereto.

6.2 The first Campaign shall be the continuous production of 1,800,000 pounds of Product. Cedar shall make its best efforts to demonstrate the ability to produce at least 15,000 pounds of Product per day using the Process. The second Campaign shall commence as soon as practicable after the end of the first Campaign and, unless A&W elects to commence production under Phase II, production under Phase I shall apply.

6.3 A&W agrees to pay to Cedar a startup fee of \$65,000 to cover training, staffing, starting up and shutting down production hereunder during the first Campaign, said fee to be paid to Cedar upon completion of the first Campaign.

6.4 A&W agrees to pay a production fee during Phase I of production of \$13,000 per day, it being understood that Cedar shall operate the Equipment for production of Product in a continuous seven day per week, twenty-four hour per day campaign. Such production fees shall be invoiced monthly by Cedar as of the end of each production month, and shall be payable ten (10) days from the date of invoice.

6.5 The parties agree to discuss amendments to the production fee at the end of the Qualification Run to determine a mutually agreeable cost per unit production fee; provided, however, the per diem fee stated hereinabove shall continue to be the applicable fee if the parties fail to reach such agreement.

## 7. PLANT MODIFICATION AND EQUIPMENT

7.1 Prior to startup of Phase I of the toll manufacturing process, the parties acknowledge that Cedar must make those additions, modifications and improvements to its No. 10 production unit, more particularly identified in Exhibit E attached hereto (the "Modifications") which Modifications are deemed by A&W adequate to enable Cedar to produce Product in accordance with the provisions applicable to Phase I of this Agreement. It is acknowledged that A&W has already paid Cedar the sum of \$50,000 to initiate work on these Modifications. Cedar agrees to complete the Modifications as promptly as possible; to notify A&W when the Modifications are complete; and to provide A&W with its total costs and expenses incurred in carrying out the Modifications with reasonably detailed supporting documentation. A&W shall reimburse Cedar its entire costs in carrying out the Modifications (the "Phase I Equipment Fee") estimated to total \$185,000, of which the \$50,000 payment referred to above is a part. A&W shall be entitled to audit the books and records of Cedar related to the Modifications upon reasonable notice.

7.2 The Phase I Equipment Fee is based upon the understanding that a minimum quantity of 1,800,000 pounds of Product will be toll manufactured by Cedar. If Cedar fails to

After Qualification Run  
↓

manufacture at least 1,800,000 pounds of Product during the first Campaign for any reason other than A&W's negligence or fault, breach of any representation or covenant herein by A&W, Cedar's inability to obtain permits required for its performance hereunder, or an event of force majeure, Cedar shall refund a pro rata share of the Phase I Equipment Fee to A&W upon A&W's demand therefore.

7.3 In order to commence Phase II, the parties acknowledge that additional equipment, additions, modifications and improvements must be made to increase production per day. Cedar shall give A&W the maximum cost to be charged to A&W for Phase II equipment by November 15, 1991. It shall be A&W's option, in its sole discretion to commence Phase II or to continue production under Phase I terms. A&W will notify Cedar in writing of whether to do Phase II or continue in Phase I for the second campaign by December 15, 1991.

7.4 A&W agrees to loan certain vacuum pumps, miscellaneous equipment and replacement parts ("A&W Equipment") to Cedar during the term hereof. Cedar agrees to maintain the A&W Equipment in good operating condition in accordance with recommended maintenance schedules and procedures, and to insure the property against damage in accordance with Section 4.2, and to indemnify and hold A&W harmless from and against arising from or connected with the operation, use or maintenance of the A&W Equipment while such A&W Equipment is in the possession and under the control of Cedar. Upon termination of this Agreement, Cedar shall return the A&W Equipment to A&W in as good condition as delivered hereunder, normal wear and tear excepted. The A&W Equipment shall be used exclusively in the manufacture of the Product.

## 8. WASTE DISPOSAL

8.1 Cedar shall handle, and contract for the facilities to handle, the neutralization, storage, transportation and disposal of all the liquid wastes and by-products generated in the manufacture of the Product. All third parties with which Cedar contracts for handling, neutralizing, storage, transportation and disposal shall be duly licensed under applicable federal, state and local laws to perform such services and shall be insured and bonded. Disposal shall be by means selected by Cedar and approved by A&W. A&W has the right to audit all waste disposal related to the Product and its production hereunder. Cedar shall monitor the volume of all wastes generated and shall keep such records as are reasonably required by A&W and as may be required by local, state and federal authorities. A&W shall pay the invoice price for all off-Plant waste disposal.



50% of  
SAVINGS  
↓

8.2 In the event Cedar, with A&W's approval, undertaken any aqueous waste disposal utilizing treatment and disposal facilities located on Cedar's Plant, A&W shall pay Cedar for such disposal at the rate of \$ \_\_\_\_\_ per gallon.

8.3 Cedar shall indemnify and hold A&W, its parent, Tenneco Inc., and affiliates and subsidiaries harmless against all loss, cost, damages, fines, penalties, liability and expense (including reasonable attorney's fees) ("liabilities") arising out of Cedar's disposal of liquid waste or by-product at Cedar's facility. When waste or by-product is disposed of by third parties contracted in accordance with Section 8.1, Cedar shall (i) procure for the express benefit of A&W and Cedar an indemnification from such third parties for all liabilities associated with such disposal, and (ii) require evidence of insurance on such third party covering the liabilities and naming Cedar and A&W as additional insureds.

## 9. REPORTS AND AUDITS

9.1 Cedar shall supply A&W with production reports on forms agreed to by the parties, and such reports shall be sent to A&W at reasonable time intervals agreed upon by the parties.

9.2 A&W shall have the right to make, or have its auditors make, a stock audit (either physical or book inventory or both) from time to time and at such reasonable times as it may elect and A&W shall have access to Cedar's books and records for this purpose. A&W shall give reasonable notice of such election and shall carry out such audit so as not to interfere with the continued operation of the business of Cedar. Losses reported by Cedar or computed on the basis of A&W audits shall be the difference between (i) the original inventory or the inventory as of the preceding audit, plus deliveries to Cedar, less deliveries by Cedar on A&W's order; and (ii) the inventory as of the date of the current audit. Any payments for shortages shall be based on A&W's actual costs, and shall be made within thirty (30) days of A&W's notification to Cedar and Cedar's acceptance thereof.

## 10. ACCESS TO PLANT

Cedar shall keep A&W fully and currently informed with respect to the production of the Product and shall afford access to A&W personnel to observe the production operation. A&W shall hold Cedar harmless from and indemnify it against all claims and liability on account of personal injury suffered by such A&W personnel while in Cedar's facility, except to the extent that such injury results from the negligence or willful misconduct of Cedar or its employees or agents.

NEED CERTIFICATE  
of INSURANCE  
↓

## 11. PROCESS IMPROVEMENTS

Information developed in the course of and related to the production of the Product hereunder shall be promptly disclosed to A&W. As between Cedar and A&W, such information except as it relates to improvements or changes to equipment or its operation, whether patentable or not, shall be the sole and exclusive property of A&W.

## 12. TAXES

Cedar shall be responsible for, and will pay, all personal property taxes levied on A&W's property while in the custody of Cedar, and Cedar shall pay all taxes and fees in respect to or measured by the manufacture of the Product or the storage or delivery of A&W's property but Cedar shall not be responsible for and A&W shall be responsible for and shall pay all taxes in the nature of sales taxes levied on the Product delivered pursuant to A&W's instructions. Cedar shall provide A&W with receipts for taxes paid by it hereunder for A&W's account.

## 13. RIGHTS UPON TERMINATION

All Raw Materials, product in process and the Product remaining in Cedar's possession on termination of this Agreement shall be shipped to A&W or its designee at A&W's expense. Further, all drawings, reports and other data relating to the subject matter of this Agreement, which have been or are delivered to Cedar by A&W, shall be and remain the property of A&W and shall be returned to A&W upon termination of this Agreement or in accordance with the terms of the Secrecy Agreement. Cedar is expressly prohibited from making copies of any such drawing, reports or other data supplied by A&W and related to the subject matter of this Agreement, other than as necessary to perform this Agreement. Cedar shall not use A&W's proprietary information in competition with A&W for the term hereof and for a period of ten (10) years after termination of this Agreement. This covenant shall survive the termination of this Agreement and the Secrecy Agreement.

## 14. INDEMNIFICATION

Except with respect to indemnification pursuant to Section 8 of this Agreement:

14.1 Cedar acknowledges that it has been made aware of the nature of the Raw Materials and the Product. Cedar acknowledges that it has been supplied with the Material Safety Data Sheets (see Exhibits G and H) for the Raw Materials and by-products and the Material Safety Data Sheets for the Product ("the Sheets"). Cedar agrees to warn all persons who may become exposed to such Raw Materials, by-products and/or the Product, while on Cedar's

Plant, of any hazards indicated on said Sheets as being associated with such Raw Materials, by-products and/or the Product, and to comply with said Sheets. Except with respect to A&W's employees or contractors, Cedar shall indemnify and save harmless A&W from and against any and all losses, liability, damage and expense (including reasonable attorneys' fees) of every character whatsoever, for injuries, sickness, disease or death (including death resulting from such injuries, sickness and/or disease) sustained by any person, arising out of or resulting from Cedar's failure to warn any such persons and/or to comply with said Sheets.

14.2 A&W acknowledges that it has been made aware of the nature of the Raw Materials, by-products and the Product. A&W acknowledges that it possesses or has been supplied with the Material Safety Data Sheets ("Sheets") (see Exhibits G and H) for the Raw Materials, by-products and the Product. A&W agrees to warn all persons who may become exposed to such Raw Materials, by-products and/or the Product, while in A&W's custody or control, of any hazards indicated on said Sheets as being associated with such Raw Materials, by-products and/or the Product, and to comply with said Sheets. Except with respect to Cedar's employees or contractors, A&W shall indemnify and save harmless Cedar from and against any and all losses, liability, damage and expense (including reasonable attorneys' fees) of every character whatsoever, for injuries, sickness, disease or death (including death resulting from such injuries, sickness and/or disease) sustained by any person, arising out of or resulting from A&W's failure to warn any such persons of hazards indicated on the Sheets and/or to comply with said Sheets.

14.3 Cedar agrees to hold A&W harmless from and to indemnify A&W against all loss, cost, damages, liability and expense (including reasonable attorney's fees) on account of death, personal injury or property damage that results from or is related to an occurrence involving Cedar's handling or storage of Raw Materials or Cedar's manufacture, handling, storage, or delivery to the Carrier of the Product during periods when such Raw Materials or the Product are in Cedar's possession or control, unless and to the extent caused by A&W's negligence.

14.4 A&W agrees to hold Cedar harmless from and to indemnify Cedar against all loss, costs, damages, liability and expense (including reasonable attorney's fees) on account of death, personal injury or property damage that results from or is related to occurrences involving the handling, storage, transportation, sale or use of Raw Materials delivered to Cedar hereunder and the Product produced by Cedar hereunder when such Raw Materials and the Product are not in Cedar's possession and control, unless and to the extent caused by Cedar's negligence.

14.5 Neither party shall be liable to the other for any indirect, incidental or consequential damages, regardless of fault or concurrent negligence of the parties.

15. COMPLIANCE WITH LAWS

Both parties shall fully comply with every federal, state and local law, ordinance, order, rule and regulation to which it is subject as a result of and to the extent required by their obligations hereunder including, without limitation, the Fair Labor Standards Act, as amended, and Executive Order No. 11246 (Equal Employment Opportunity) with all amendments thereto or as it may be superseded, and both parties agree that all the provisions of said Executive Order, as amended or superseded, are hereby made a part hereof by reference and are binding upon the parties. Both parties confirm that they have complied and they and their subcontractors and vendors will comply with the applicable provisions of said Executive Order and the rules and regulations promulgated under the authority thereof, including, among others, reporting requirements. Each party shall indemnify and save the other harmless from all costs, damages, fines, penalties, liabilities, losses and expenses the other party shall incur as a consequence of the violation of any law, ordinance, order, rule or regulation by the offending party. A party shall not be deemed in violation of any law, ordinance, order, rule or regulation while any governmental finding of such violation is being contested in good faith by that party.

Cedar specifically agrees that it shall comply with all applicable health, safety and environmental laws, regulations, rules and orders related to the manufacture, handling, storage, transportation and disposal of the Product, the Raw Materials, the Intermediates and any wastes.

16. CONTINGENCIES

No liability shall result from non-performance or delay in performance caused by circumstances, including, without limitation, fire, flood, acts of God, strikes, riots, governmental action or inaction and the like, so long as the circumstance causing such delay or non-performance is beyond the control of the affected party; provided, however, that any party whose performance is prevented or impeded by such circumstances shall promptly provide written notice, with reasonable particulars, to the other party.

17. NOTICES

All notices required herein shall be deemed to be properly served if sent by first class mail with postage fully prepaid thereon, or by facsimile and addressed to the party for whom intended at the following addresses:

If to A&W: Albright & Wilson Americas Inc.  
100 Lakeridge Parkway  
Ashland, VA 23005  
Attn: Peter Hastings  
Phone: (804) 550-4348  
Fax: (804) 550-4385

If to Cedar: Cedar Chemical Corporation  
5100 Poplar Avenue  
Memphis, TN 38137  
Attn: Geoffrey L. Pratt  
Phone: (901) 684-5373  
Fax: (901) 684-5398

## 18. TERMINATION

18.1 Default - Anything elsewhere in this Agreement to the contrary notwithstanding, if a party breaches any of its obligations hereunder, the non-defaulting party may terminate this Agreement effective fifteen (15) days following written notice to the defaulting party of such default, provided such default shall not have been cured by the effective day of such notice.

18.2 Upon sale of all or substantially all of A&W's assets related to the production of Product, A&W or its successor may terminate this agreement by giving Cedar 60 days written notice. Upon termination, A&W's exclusive liability shall be to pay for goods identified to this Agreement.

## 19. INDEPENDENT CONTRACTOR

Neither Cedar nor any employees of Cedar are employees of A&W, it being understood that Cedar is an independent contractor and is solely responsible for the employment, control and conduct of Cedar's employees.

## 20. NO CLAIMS

As of the date of execution of this Agreement, each party represents and warrants that it knows of no claim against the other under any provision of this Agreement.

## 21. GENERAL

The parties further agree as follows:

21.1 This Agreement shall be governed by the laws of the Commonwealth of Virginia without giving effect to its choice of law rules.

21.2 This Agreement constitutes the entire agreement between the parties with regard to the matters contained herein and there are no understandings or agreements, express or implied, not expressly set forth herein. No modification of this Agreement or waiver of any of its provisions shall be effective unless it is in writing and signed by the party to be bound thereby. Neither party's waiver of any breach of any of the provisions of this agreement shall be deemed to be a waiver of any subsequent breach of the same nature or any breach of a different nature. To the extent that either or both of the parties find it convenient to employ their normal forms of purchase order or acknowledgment of order in administering the terms of this Agreement, it or they may do so, but none of the terms and conditions printed or otherwise appearing on such form shall be applicable except to the extent that they reflect the quality, mode of shipment, or timing of deliveries.

21.3 This Agreement shall bind the successors and assigns of the parties hereto, but neither party may assign its interest in this Agreement without the prior written consent of the other party, which consent shall not be unreasonably withheld, provided, however, either party may assign its rights in this Agreement to a subsidiary of such party or to a purchaser of all or substantially all of such party's business or assets, or of the business or assets to which this Agreement relates, provided further that if a party seeks to assign its interest in this Agreement and the other party refuses to consent to such assignment, this Agreement will terminate without liability to either party.

21.4 All Exhibits referred to herein are deemed to be incorporated herein and made a part hereof. The section headings in this Agreement are inserted for convenience only and are not to be construed as part of this Agreement nor as a limitation of the scope of the particular sections to which they refer.

IN WITNESS WHEREOF, A&W and Cedar have caused this Agreement to be executed by their duly authorized representatives.

ALBRIGHT & WILSON AMERICAS INC. CEDAR CHEMICAL CORPORATION

BY \_\_\_\_\_

BY \_\_\_\_\_

TITLE \_\_\_\_\_

TITLE \_\_\_\_\_

DATE \_\_\_\_\_

DATE \_\_\_\_\_

A:\TOLLING.CED

**ALBRIGHT & WILSON**  
Americas

P.O. Box 26229, Richmond, Virginia 23260-6229  
Telephone (804) 550-4300  
FAX (804) 550-4385

RECEIVED  
AUG 26 1991

August 23, 1991

Ans'd.....

Mr. Geoffrey Pratt  
Cedar Chemical Corporation  
5100 Poplar Avenue  
Memphis, TN 38137

FEDERAL EXPRESS

RE: DEHPA® Tolling Agreement

Dear Geoff:

I enclose the exhibits which accompany the DEHPA® Tolling Agreement. Please attach one set of exhibits to each of the agreements sent to you by mail on August 22, 1991.

If you have questions concerning the Agreement, please call me at (804) 550-5508. I look forward to hearing from you.

Sincerely,



Deborah K. Newell  
Legal Counsel

DKN/crd

Enclosures

cc: Pete Hastings

DEHPA® is a registered trademark of Albright & Wilson.



ALBRIGHT & WILSON AMERICAS INC.  
A Tenneco Company

## **EXHIBIT LIST**

- Exhibit A - Raw Materials Specifications**
- Exhibit B - DEHPA Specifications**
- Exhibit C - Analytical Procedures**
- Exhibit D - Tank Car Trip Lease Agreement**
- Exhibit E - Technical Data Concerning Manufacturing Process**
- Exhibit F - Anticipated Yield**
- Exhibit G - Material Safety Data Bulletin For Raw Materials**
- Exhibit H - Material Safety Data Bulletin For DEHPA**
- Exhibit I - Equipment and Piping Modifications to Cedar's No. 10  
Production Unit, W. Helena, Arkansas**



**EXHIBIT A**

**SPECIFICATIONS**

**RAW MATERIALS**

EXHIBIT A

SPECIFICATIONS - RAW MATERIALS

SUPPLIED BY A&WA:

Phosphorus Trichloride (PCl<sub>3</sub>)

Assay	99.5% Minimum
Color (APHA)	20 Maximum
Turbidity NTU	0.5 Maximum
Iron, ppm	1.0 Maximum
Specific Gravity (15.5°C/15.5°C)	1.586

2-Ethylhexyl Alcohol (2-EHA)

Assay	99.5% Minimum
Water Content, wt%	0.1 Maximum
Color (Pt-Co)	5 Maximum
Specific Gravity @ 20°C/20°C	0.834

SUPPLIED BY CEDAR:

Chlorine (Cl<sub>2</sub>)

Assay	99.8% Minimum TECHNICAL GRADE
-------	----------------------------------

**EXHIBIT B**

**SPECIFICATION**

**DEHPA**

SPECIFICATION - DEHPADi-2-Ethylhexyl Phosphoric Acid

		<u>Method of Analysis</u>
Assay	95% Minimum	D-11
Mono(2-Ethylhexyl) Phosphoric Acid	3.0 Maximum	D-11
Color, Gardner	5 Maximum	Gardner Comparitor
Water	0.5% Maximum	Karl Fischer
Refractive Index at 25°C	1.440 Minimum 1.444 Maximum	R-64
Specific Gravity 10/4°C	0.96 Minimum 0.99 Maximum	R-63

## **EXHIBIT C**

### **ANALYTICAL PROCEDURES**

<u>Sample</u>	<u>Time</u>	<u>Analysis</u>	<u>Names</u>	<u>Ranges</u>
New 2EHA	when trucks or tank cars received	Water Purity	KF DEHPA-1	<0.1% typical 2EHA
Reactor	after $\text{PCl}_3$ addition	2EHA TEHPO	DEHPA-2 DEHPA-2	.3 - .7% <.5%
Reactor	after $\text{Cl}_2$ addition	BEHHP	DEHPA-6	<.3%
Organic Scrub.	before transfer to reactor	BEHHP TAN	DEHPA-6 DEHPA-13	+ 15% ---
Hydro Tank, water layer	after 1st hour of hydrolysis, then every $\frac{1}{2}$ hour until constant HCl level reached	HCl	DEHPA-8	constant
Stripper Hydro	after 3rd hour of hydrolysis, then every $\frac{1}{2}$ hour until constant TAN reached	TAN	DEHPA-5	constant
Stripper	after water strip	Water	KF	<.2%
Stripper	after EHCl strip	EHCl TEHPO MEHPA DEHPA	DEHPA-10 DEHPA-10 DEHPA-11 DEHPA-11	< 1% --- < 3% + 95%
Day Tank	when full	EHCl TEHPO MEHPA DEHPA TAN Water Color SG N25/D	DEHPA-10 DEHPA-10 DEHPA-11 DEHPA-11 DEHPA-11 KF Gardner R-63 R-64	< 1% --- < 3% + 95% --- < 1% < 5 .96 - .99 1.440 - 1.444
HCl strong acid tank	before pumping to storage	HCl Chlorine	DEHPA-8 DEHPA-12	29 - 32% ---
Storage Tanks	before loading drums, tank trucks or tank cars. Sample weekly when tanks are full	Water MEHPA DEHPA EHCl TEHPO TAN Color SG N25/D	KF DEHPA-11 DEHPA-11 DEHPA-10 DEHPA-10 DEHPA-11 Gardner R-63 R-64	< 1% < 3% + 95% < 1% --- --- < 5 .96 - .99 1.440-1.444

METHOD DEHPA-1

GC ANALYSIS OF 2EHA

Application:

This procedure is used to determine the purity of 2EHA and IOA.

Equipment:

H.P. GC, 5880 with T.C. detector  
1/8" x 20" SS column packed with 3% OV 225 on Gaschrom Q 100/120 mesh  
UL syringe

GC Conditions:

Detector temperature	300 C
Injection temperature	250 C
Helium flow	30 cc/min.
Oven temperatures	programmed, 50-250°C at 20°/min.
Attenuation 8 Threshold 6	

Procedure:

Inject one UL of sample and start the programmer. Obtain the area % of the 2EHA.

Calculations:

The purity of the sample is the area % minus the water content of the sample.

GC ANALYSIS OF B<sub>2</sub>EHHP REACTOR FOR 2EHA AND T<sub>2</sub>EHPO<sub>4</sub>Application:

This procedure is used to determine the percent 2EHA & T<sub>2</sub>EHPO<sub>4</sub> in the reactor after the PCI<sub>3</sub> - 2EHA reaction.

Equipment:

H.P. GC, 5880 with TC Detector  
 1/8" x 20" SS column packed with 3% CV 225 on Gaschrom Q 100/120 mesh  
 UL syringe

GC Conditions:

Detector temperature	300 C
Injection port	250 C
Helium flow	30 cc/minute
Oven temperature	programmed, 80-250 20°/minute, final t
Attenuation - 8 Threshold-6	2 minutes

Procedure:

Place approximately 30 ml of sample into a 4 oz. bottle & sparge with nitrogen for 15 minutes to remove HCl.

Inject one UL of sample into the column and start programmer.

Calculations:

% 2EHA = Area % times response factor  
 % T<sub>2</sub>EHPO<sub>4</sub> = Area % times response factor

The response factor is obtained by running a prepared standard containing known % of 2EHA & T<sub>2</sub>EHPO<sub>4</sub>.

$$\frac{\text{Weight \%}}{\text{Area \%}} = \text{Response factor}$$

Approximate retention times

2EHA - 1.30 min.  
 T<sub>2</sub>EHPO<sub>4</sub> - 7.90 min.



B2EHHP ACID BASE ANALYSIS

Application:

This procedure is used to determine the Dialkyl content of B2EHHP Reactor samples & in the recovered 2EHCl.

Reagents:

Methanol - anhydrous  
0.1 N Alcoholic KOH - carbonate free, standardized  
0.1 N HCl - standardized against the KOH with methyl red  
0.1% Methyl Red Indicator in methanol

Apparatus:

Eye dropper & weighing vial  
250 ml erlenmeyer flask & stopper  
Nitrogen sparging apparatus

Procedure:

Place approximately 30 ml of sample into a 4 oz. bottle & sparge for 15 minutes to remove HCl.

Add 25 ml of methanol to a 250 ml flask

Add a sample weight of 0.3 - 0.4 grams, weighed to the nearest 0.1 mg, to the flask.

Add 5 drops of methyl red indicator, & titrate dropwise with the KOH to the canary yellow color.

Add 25.0 ml of KOH, 20 ml of distilled water, stopper the flask & mix well. Allow the flask to stand for 20 minutes.

Titrate with the HCl to the methyl red end-point (reddish-pink) & record the ml of HCl.

Calculations:

$$\frac{(25.0 \times N \text{ KOH}) - (\text{ml HCl} \times N \text{ HCl}) \times 306.4}{\text{sample weight} \times 10} = \% \text{ Di}$$

### Correction For Excess $\text{PCl}_3$ in the Reactor

If there is no excess EHOH in the reactor, the following procedures must be used to determine the amount of EHOH to add to the reactor.

1. Weigh 200.0 grams of the reactor sample into a pint bottle.
2. Add 10 grams of EHOH, cap the bottle and mix well.
3. Let the bottle of "spiked sample" stand for 30 minutes.
4. Transfer about 30 ml to a 2 oz. bottle, and sparge for 15 minutes to remove the HCl.
5. Run the sparged sample through the GC to determine the excess EHOH.

#### Calculation:

$$(5.0) - (\text{excess EHOH from spiked sample}) = \% \text{ EHOH to add.}$$

DETERMINATION OF HCl CONTENT IN  
Di(2-ETHYLHEXYL) PHOSPHOROCHLORIDATE (DEHPC)

Application:

This procedure is used to determine the percent free HCl in DEHPC by potentiometric titration in a non-aqueous system with tripropylamine.

Reagents:

Acetone - reagent grade  
Chlorobenzene - reagent grade  
Tripropylamine - certified, Fisher #B-225  
Maleic Acid - reagent grade

0.1N Tripropylamine - Dilute 18.9 ml of tripropylamine to one liter with chlorobenzene and mix well.  
Standardize - Weigh approximately 0.1 g of Maleic Acid, to the nearest 0.1 mg, into a 150 ml beaker. Add approximately 80 ml of acetone & titrate potentiometrically with 0.1 N tripropylamine to obtain the inflection point.

$$\text{Normality} = \frac{\text{wt. of Maleic Acid}}{\text{ml} \times 0.1161}$$

Apparatus:

Potentiometric titrator  
150 ml beaker  
Eye-dropper & weighing vial

Procedure:

Accurately weigh approximately one gram of sample into a 150 ml beaker.

Add 80 ml of acetone to the beaker & place on the titrimeter.

Titrate through the inflection point & obtain the ml of tripropyl amine required to reach the inflection point.

Calculation:

$$\% \text{ HCl} = \frac{\text{ml} \times N \times 3.65}{\text{sample wt.}}$$

ANALYSIS OF D2EHPA THE SECOND HYDROLYSIS

Application:

This procedure is used to determine the acid number of the D2EHPA during the second hydrolysis.

Reagents:

0.1 N NaOH - standardized  
Acetone - reagent grade  
Phenolphthalein Indicator - 1% in ethanol

Apparatus:

Eye dropper & weighing vial  
125 ml erlenmeyer flask

Procedure:

Add a sample weight of 0.4 - 0.5 g, weighed to the nearest 0.1 mg, to a 125 ml flask.  
(note: top layer)

Add 30 ml of acetone & 10 ml of water to the flask & mix well.

Add 5 drops of phenolphthalein & titrate with the NaOH to the pink end-point. Record the ml of NaOH used.

Calculations:

$$\frac{(\text{ml} \times N \times 56.1)}{\text{sample wt.}} = \text{Acid No., mg KOH/g}$$

GC ANALYSIS OF CHLORIDATE REACTOR FOR % B<sub>2</sub>EHHPApplication:

This procedure is used to determine the Area % B<sub>2</sub>EHHP in relation to the Area % Chloridate in the reactor after chlorination of the B<sub>2</sub>EHHP.

Equipment:

H.P. GC, 5880 with TC Detector  
1/8" x 4' SS column packed with 10% UCW 982 on Chromosorb W, HP 80/100 mesh  
UL syringe

Reagents:

Chlorobenzene - reagent grade

GC Conditions:

Detector temperature	300°C
Injection port	250°C
Helium flow	30 cc/minute
Attenuation - 8 Threshold - 6	
Oven temperatures =	Intl value 215°C
	Intl time 5
	Final value 250°C
	Final time 0.0
	Program rate 30
	Post value 250°C
	Post time 5

Procedure:

Place approximately 30 ml of sample into a 4 oz. bottle & sparge with nitrogen for 15 minutes to remove HCl.

Add 15 drops of the sparged sample into a 25 ml vial.

Add 2.0 ml of chlorobenzene to the vial & mix well.

Inject one UL of sample from the vial onto the column & start the programmer.

Calculation:

$$\frac{\text{B}_2\text{EEHP Area}}{\text{Chloridate Area}} \times 100 \times 0.8 = \% \text{ BEHHP}$$

**ANALYSIS OF AQUEOUS LAYER FROM FIRST HYDROLYSIS OF D2EHPA**

**Application:**

This procedure is used to determine the percent HCl in the aqueous layer from the first hydrolysis of D2EHPA.

**Reagents:**

Phenolphthalein indicator - 1% in ethanol  
0.1 N NaOH - standardized

**Apparatus:**

125 ml erlenmeyer flask  
Eye dropper & weighing vial

**Procedure:**

Add a sample weight of approximately 1 g, weighed to the nearest 0.1 mg, to a 125 ml flask containing about 25 ml of distilled water. (note: bottom layer)

Add 5 drops of phenolphthalein indicator & titrate with the 0.1 NaOH to the pink end-point. Record the ml of NaOH used.

**Calculations:**

$$\% \text{ HCl} = \frac{\text{ml} \times \text{N} \times 3.65}{\text{sample weight}}$$

**ANALYSIS OF DEHPA EXTRACTANT FOR 2-EHCl & T2EHPO<sub>4</sub>**

**Application:**

This procedure is used to determine the percents of 2-EHCl, T2EHPO<sub>4</sub> and estimated percent of 2-Ethylhexyl Ether in DEHPA EXTRACTANT.

**Equipment:**

HP 5880 GC with TC detector and tape file  
1/8" x 18" SS column packed with 10% UCW 982 on Chromosorb W, HP 80/100 mesh  
UL syringe

**Reagents:**

Sylon HTP reagent	DEHPA EXTRACTANT Calibration Standard containing
Tetradecane reagent	known amounts of 2-EHCl, Ether and T2EHPO <sub>4</sub>

**GC Conditions:**

Injection port	250°
Detector	300°
Helium flow	30 cc/minute
Oven	80° hold 2 minutes, then program to 250° at 20°/minute hold at 250 for 2 minutes

**Sample Injection:**

One UL

**Preparation of Calibration Standard & Sample:**

1. Place 0.25 ml of Calibration Standard into a weighed 25 ml vial and obtain the weight of the standard to the nearest 0.1 mg.
2. Add 0.25 ml of Tetradecane to the vial and obtain the weight of the Tetradecane to the nearest 0.1 mg.
3. Add 1.0 ml of Sylon HTP to the vial, stopper and mix well.
4. Prepare another vial containing the sample in place of the standard following steps 1 through 3.

Procedure:

1. Run the prepared standard and then calibrate the GC using the Tetradecane as an Internal Standard.
2. Store the calibration on tape for future use.
3. Replace the weights from the standard with those of the prepared sample.
4. Run the sample and obtain the analysis from the Internal Standard Calibration.

Approximate RT:

2-EHCl-----	1.60
Tetradecane-----	5.78
Ether-----	6.18
T2EHPO4-----	10.77



TITRATION OF D<sub>2</sub>EHPA WITH POTENTIOMETRIC TITRATOR

Application:

This procedure is used to determine the percent Mono(2-ethylhexyl) and Di(2-ethylhexyl) Phosphoric Acids in D<sub>2</sub>EHPA.

Reagents:

0.1 N NaOH - standardized  
Acetone - reagent grade

Apparatus:

Potentiometric titrator  
250 ml beaker  
Eye dropper and weighing vial

Procedure:

1. Buffer titrimeter with 9.18 buffer solution.
2. Weigh 1.0 - 1.3 grams of sample, weighed to the nearest 0.1 mg, into a 250 ml beaker.
3. Add 80 ml of acetone and place on a magnetic stirrer to mix for approximately one minute.
4. Add 20 ml of distilled water and continue to mix for about one minute.
5. Flush 5 ml of 0.1 NaOH for the titrimeter and refill.
6. Place the beaker on the titrimeter and manually add 20.00 ml of the 0.1 NaOH. Refill the buret.
7. Zero the pen on the recorder chart and start the titrimeter.
8. Mark the point on the chart paper where the pen is at when the meter reads pH 8.4 and 11.0.
9. Draw a tangent line through the pH breaks on the chart paper.
10. Read the volume of 0.1 NaOH where the tangent line crosses pH 8.4 including the volume from step 6, and record as V<sub>1</sub>.
11. Read the volume of 0.1 NaOH where the tangent line crosses pH 11.0 including the volume from step 6, and record as V<sub>2</sub>.

METHOD DEHPA-11 Cont'd

Calculations:

$$M_2\text{EHPA} = \frac{(V_2 - V_1) \times 210.2 \times \text{NaOH Nor.}}{\text{Sample Wt.} \times 10}$$

$$V_2 - V_1 = V_3$$

$$D_2\text{EHPA} = \frac{(V_1 - V_3) \times 322.4 \times \text{NaOH Nor.}}{\text{Sample Wt.} \times 10}$$

**ACID NUMBER OF DEHPA REACTOR PHOSPHITE AND CHLORIDATE**

**Application:**

This procedure is used to determine the Phosphorus Acid content of the Phosphite and Chloridate Reactor samples.

**Reagents:**

Acetone - reagent  
0.1N Alcoholic KOH - standardized  
Bromthymol Blue Indicator - 0.1% in methanol

**Apparatus:**

Same apparatus set-up as for Method DEHPA-13.

**Procedure:**

1. Place a clean dry fritted glass sparging tube into a clean dry 4 oz. bottle and gently sparge nitrogen into the bottle to remove moist air.
2. Transfer the proper level of sample into the bottle and start a gentle sparge of nitrogen through the sparging tube.
3. Place the bottle into a 250 ml beaker and slowly pour warm water, 50-60°C, into the beaker being sure no water splatters into the bottle.
4. Continue sparging the sample while maintaining warm water in the beaker for approximately 45 minutes.
5. Before stopping the nitrogen sparge, check the level of HCl in the bottle by holding a Q-tip, wet with ammonia, over the neck of the bottle. If only a trace of smoke is formed, then the sample is ready to run.
6. Weigh 10 grams of the sparged sample into a 125 ml flask, add 25 ml of acetone, 5 drops of indicator then titrate with the 0.1N KOH to the first blue end-point. Carry out the titration rapidly because the color will not hold for very long.

**Calculation:**      
$$\text{TAN} = \frac{\text{ml} \times \text{N} \times 56.1}{\text{weight}}$$

7. If the TAN is greater than 2.0, determine the percent HCl in the sparged sample using Method DEHPA-4. Use about 5 grams of sample instead of 1 gram to determine the low HCl content expected.

**Calculations:**      
$$\% \text{ Phosphorus Acid} = \text{TAN} - (\% \text{ HCl} \times 15)$$

**Example:**      
$$\begin{aligned} \text{TAN} &= 3.5 \\ \% \text{ HCl} &= 0.10 \end{aligned}$$









DETERMINATION OF SPECIFIC GRAVITY BY THE FISHER-DAVIDSON GRAVITOMETER

Applicability and Limitations:

This instrument should give the specific gravities of liquids with a precision of  $\pm 0.1\%$ .

Reagents:

Reference liquid ethylbenzene -  $d_4^{20} 0.867$ . Fisher Scientific Co. No. 11-509-25.

Reference liquid tetrachloride -  $d_4^{20} 1.595$ . Fisher Scientific Co. No. 11-509-30.

Special Apparatus:

Fisher-Davidson Gravitometer. Fisher Scientific Co. No. 11-509.

Procedure:

1. Charge the L-tube with certified ethylbenzene ( $d_4^{20} 0.867$ ) through the lower end so that the liquid level stands between the two marks on the receptacle.  
  
If slugs of air occur in the ethylbenzene thread, remove them in the following way. Turn the milled knob of the suction device in a counter clockwise direction as far as it will go. Pinch the rubber tube connector between the L- and Z-tubes and then turn the milled knob slowly in a clockwise direction. This will cause the ethylbenzene to back up into the receptacle where air bubbles will be expelled. Now, return the liquid to the tube by turning the milled knob counter clockwise.
2. Turn the milled knob of the suction device clockwise as far as it will go.
3. Connect a well-cleaned Z-tube to the L-tube by means of the rubber connector and clamp the Z-tube in place in the V grooves provided on the support.
4. Level the instrument.
5. Add the liquid under examination to the cup of the Z-tube by means of a medicine dropper.
6. Slowly turn the milled knob counter clockwise in order to lift the sample into the Z-tube. If the menisci of the liquid do not stand approximately in middle of the upper and lower horizontal limbs of the Z-tube respectively, return the liquid to the cup by reversing the milled knob and make the necessary adjustment.



If the air slugs are inadvertently drawn into the Z-tube they may be removed by closing the receptacle of the L-tube with a finger tip and turning the milled knob so as to return the liquid in the Z-tube to the cup where the air will be expelled.

7. Move the slide on the scale until the index coincides with meniscus of the ethylbenzene in the L-tube. Now read the position of the index on the scale, estimating the third decimal place. The result is the specific gravity of the liquid at 20° compared with water at 4° ( $d_4^{20}$ ). To insure that the equilibrium position of the ethylbenzene was attained, the liquid in the Z-tube should be moved slightly forward or backward by means of the milled knob and the reading of the ethylbenzene meniscus repeated in each case. The sample may then be returned to the cup and recovered by means of a medicine dropper.

#### Measurement of Liquids of High Viscosity or Surface Tension

For most organic liquids, the standard Z-tubes of approximately 1.9 mm bore which requires about 0.3 ml of sample will be found satisfactory. Liquids of low viscosity may be measured in still finer tubes. If liquids of high viscosity such as oils are examined in the standard Z-tubes, a slow attainment of equilibrium will be observed. For these liquids the 2.6-3.0 mm tubes requiring about 1.0 ml of sample will be satisfactory. The tendency of water and aqueous solutions to "stick" in capillary tubes makes it desirable to test these liquids in the 4 mm tube, it is recommended that the liquid under examination be added to the Z-tube before the tube is attached to the instrument.

#### Measurement of Liquids of Specific Gravity Above 2.000

With ethylbenzene in the L-tube, the range of the Fisher-Davidson Gravitometer is from 0.600 to 2.000. For liquids of higher specific gravity, the ethylbenzene may be replaced by certified carbon tetrachloride ( $d_4^{20}$  1.595). The readings of the scale are then multiplied by 1.595/0.867 or 1.84. To remove the ethylbenzene in the L-tube, replace the rubber connector in the L-tube by a tube leading to a trap connected to source of suction. Suck out the ethylbenzene and allow the suction to run for a few minutes.

#### The Influence of Temperature

For most organic liquids, the readings obtained with the Fisher-Davidson Gravitometer correspond closely for  $d_4^{20}$  even if the observations are made at temperature several degrees above or below 20°. The reason for this is that the measurement of an organic liquid is made relative to another organic liquid (the reference liquid in the L-tube) and most organic liquids have temperature co-efficients of density which lie within a narrow range.

The variation of the density of liquid with temperature may be expressed by the equation.

$$d_4^t = d_4^0 - dt - Bt^2$$

For short intervals,  $Bt^2$  may be neglected, the expression being simplified to read.

$$d_4^t = d_4^0 - dt$$

For purposes of comparison, the percentage change in density in the vicinity of  $20^\circ$  (represented by the symbol,  $c$ ) is convenient to employ, for if  $c$  is the same for two liquids, the values of their relative densities will be the same at all temperatures.

$$c = \frac{100d}{d_4^{20}}$$

The values of  $c$  for 156 organic liquids whose densities were studied by Bosart (perf. Ess. Oil Record 30, 145, 1939) have been calculated. These range from 0.049 to 0.162 with a mean of 0.097 and an average deviation of 0.018. Since ethylbenzene ( $c = 0.101$ ) has a coefficient close to the mean value, the effects of departure of other liquids from the reference liquid are minimized. On the average, the values of specific gravity observed at  $20^\circ \pm 5^\circ$  will not differ from those observed at  $20^\circ$  by more than 0.1%.

If the coefficient of expansion of the liquid under examination,  $c_x$ , is known, the correction to be added to the observed reading is

$$\frac{(t-20^\circ)(c_x-0.101)(d_{obs.})}{100}$$

This correction may be illustrated by means of a reading made with water the expansion of which differs markedly from organic liquids ( $c = 0.021$ ). A reading of the specific gravity of water made at  $25^\circ$  gave  $d_{obs.} = 1.002$ . The correction to be applied is

$$\frac{(25^\circ - 20^\circ)(0.021-0.101)(1.002)}{100} = -0.004$$

Hence, the corrected value for  $d_4^{20}$  is  $1.002 + (-0.004) = 0.998$

**This method is applicable to the determination of the refractive index of most organic liquids and solutions. Volatile liquids will create difficulties through evaporation.**

**Refractometer - Bausch and Lomb  
"Abbe-3L" or equivalent**

**\*\* Correction for temperature: If the observed index is read at a temperature higher than the standard temperature, ADD a correction of 0.0004 per °C. If the observed index is read at a temperature lower than the standard temperature, SUBTRACT a correction of 0.0004°C.**

**TEST SCHEDULE J**

**PHOSPHORUS TRICHLORIDE**

Assay ( $\text{PCl}_3$ )	99.5% Minimum by GC scan	same
Color, APHA	20 Maximum	same
Turbidity	No visible turbidity	Water White Liquid
*Distillation Range, 760 mm	75.0° - 76.5°C (Typical)	same
Distillation Residue	0.5% Maximum	same
Free Phosphorus		None Detectable

**\*Note:** Run Distillation Range when requested and on all tank car shipments.

ANALYSIS OF PHOSPHORUS CHLORIDES & PHOSPHORUS OXYCHLORIDES

BY GAS CHROMATOGRAPHY

Applicability:

This method is applicable to the determination of volatile impurities in phosphorus chlorides and to the assay of the phosphorus chloride by difference.

Equipment:

Gas chromatograph equipped with isothermal oven control, thermal conductivity detector, recorder and Peak Area Integrator; 10 microliter syringe; four feet of 1/8" SS column packed with 10% UCW-982 WHP.

Conditions:

Detector Temperature	300°C
Oven Temperature	50°C
Injection Port Temperature	200°C
Sample Size	1 microliter
Helium Flow	40 CC/min.

Procedure:

1. Inject one microliter of sample under the prescribed conditions and record the chromatograph. Order of Elution: (Injection peak),  $\text{PCl}_3$ ,  $\text{POCl}_3$ ,  $\text{PSCl}_3$ , and  $\text{AsCl}_3$ .
2. From prepared solutions of known concentration determine either the peak height or area percent response for the impurities and from this determine the concentration of impurities in the sample. The major component is determined by subtracting the sum of the impurities from 100%.

Notes:

1. It is necessary to use a clean, very dry syringe to inject the sample with. Also, the syringe must be flushed thoroughly with water immediately after use and dried.
2. After sample analysis is finished, inject 1  $\mu\text{L}$  of Trimethyl Phosphite into column and program the oven temperature to 240°C for 4 minutes.

CAUTION:

Phosphorus chlorides are fuming corrosive liquids and precautions against exposure must be taken.

**EXHIBIT D**

**TANK CAR TRIP LEASE AGREEMENT**

**TANK CAR TRIP LEASE AGREEMENT**

THIS AGREEMENT made the \_\_\_\_\_ day of \_\_\_\_\_ 19\_\_\_\_, by and between Albright & Wilson Americas Inc. having its principal office and place of business located at 100 Lakeridge Parkway, (Hanover County) Ashland, Virginia, 23005, hereinafter called "Lessor" and

\_\_\_\_\_ having its principal office and place of business at \_\_\_\_\_ hereinafter called "Lessee".

**WITNESSETH:**

WHEREAS, Lessor from time to time desires to ship \_\_\_\_\_ in private rail cars to the private tracks of Lessee at \_\_\_\_\_.

WHEREAS, Lessee desires to use said rail cars on its private tracks for the temporary storage of the commodity shipped therein.

NOW THEREFORE, in consideration of the premises and of the mutual undertakings hereunder, the parties have agreed as follows:

1. The provisions of this Agreement shall become operative upon each and every said car shipped by Lessor to Lessee, during the life of this Agreement. Such car(s) become leased to and by the Lessee from the time cars are delivered by Lessor to the railroad at point of shipment and shall remain under this Agreement until unloaded and delivered by Lessee to the railroad for return to the Lessor. Lessor will board said cars and mark the bill of lading and shipping order covering their movement or stencil said cars as provided in Rule 1, Section B, Subparagraph 4 of the Railroad Demurrage Code.

2. Each such car while leased hereunder shall be at the risk of the Lessee and used solely for the temporary storage of material purchased from Lessor on the private tracks of the Lessee at the destination named herein. It is further agreed that as soon as unloaded, said car shall be returned promptly to Lessor in the same good condition as upon arrival via route specified by Lessor; and delivery by Lessee of said car to a common carrier, with instructions for return to Lessor, shall be deemed to be delivery to Lessor. Lessee agrees to advise Lessor promptly, by the use of the return portion of the bill of lading, each date and time when cars arrive, are placed (actual or constructive placement whichever is first) unloaded and/or are delivered back to the carrier.

3. If any car is in a defective or damaged condition upon arrival at Lessee's private siding or track, Lessee will immediately notify Lessor and an authorized agent of the railroad which delivered the car. Lessee will secure from the agent a written acknowledgment of the defective or damaged condition.

4. All mileage allowed by carriers shall accrue to and be collected by Lessor.

5. An allowable free time of 7 days is provided herein. For all days Lessee detains each car beyond the allowable free days on Lessee's private siding, Lessor will charge the Lessee at \_\_\_\_\_ rate per day, which the Lessee agrees to pay.

6. Lessee shall be responsible for, and hereby assumes all liability with respect to, all damage to and all loss or destruction of, any car (including the car's fittings and appurtenances), other than damage, loss or destruction due to normal wear or tear or the sole negligence of Lessor, occurring after a car has been delivered by a railroad to Lessee and while a car is in the possession or control of Lessee, whether or not such damage, loss or destruction results from negligence or default of Lessee. Lessee shall reimburse Lessor for the cost to Lessor of repairing, reconditioning or replacing any car in an amount not to exceed the actual cash value of the car at the time of such damage, loss or destruction. Lessee agrees to report to Lessor all damage to loss of, or destruction of any car arising while a car is in the possession or control of Lessee. Lessee shall not repair, recondition or replace any car without Lessor's prior written consent.

7. Lessee will indemnify Lessor against any loss, damage, or expense including reasonable attorney's fees on claims for injury or death to any person or for damage to any property that may occur or arise while the car or cars are under lease to Lessee, whether or not said loss or damage or injury is caused solely by negligence of Lessor, its agents or employees.

8. Lessee shall not assign, transfer, encumber or otherwise dispose of this lease, the cars or any part thereof, or loan, sublet or underlet the cars hereby leased, or change or permit to be changed or altered the present lettering and/or numbering on said cars without the consent of the Lessor in writing being first obtained. Lessee shall not permit or suffer any encumbrances or liens to be entered or levied upon the cars, or any part thereof.

9. This Agreement shall continue in full force and effect from the date hereof unless canceled by either party upon fifteen days written notice to the other party or until all of said cars have been returned to railroad as provided in Paragraph 2, whichever date first occurs. All obligations of Lessee incurred under this agreement shall survive such termination.



IN WITNESS WHEREOF, the parties have caused this Agreement to Executed in duplicate.

Witness

ALBRIGHT & WILSON AMERICAS Inc.  
(Lessor)

\_\_\_\_\_

BY \_\_\_\_\_  
Manager-Traffic

\_\_\_\_\_ (Lessee)

Witness

\_\_\_\_\_

By \_\_\_\_\_  
Title

**EXHIBIT E**

**TECHNICAL DATA CONCERNING MANUFACTURING PROCESS**

## **PROCESS DESCRIPTION**

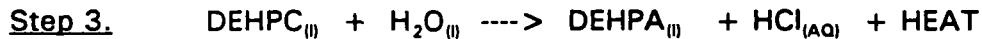
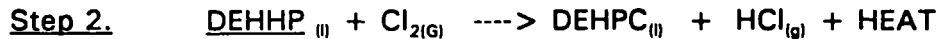
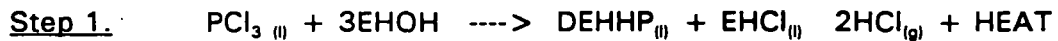
### **A. CHEMISTRY AND REACTIONS**

## GENERAL PROCESS DESCRIPTION

### DEHPA (Di - 2 - Ethylhexyl) Phosphoric Acid Production

#### A. Chemistry and Reactions

The manufacture of DEHPA involves consecutive batch processing of the raw materials in different vessels to produce the final product. Initially phosphorus trichloride ( $\text{PCl}_3$ ) and 2-ethylhexyl alcohol (EHOH) are reacted to form di-2-ethylhexyl hydrogen phosphite (DEHHP). Hydrogen Chloride (HCl) and 2-ethylhexyl chloride (EHCl) are by-products. Di-2-ethylhexyl hydrogen phosphite is then reacted with chlorine gas ( $\text{Cl}_2$ ) to form di-2-ethylhexyl phosphochloridate (DEHPC) and HCl. Finally di-2-ethylhexyl phosphochloridate is hydrolyzed to form the final product of DEHPA. The chemical formulas for the reactions as following:



## **PROCESS DESCRIPTION**

### **B. Process Flow Diagrams**

- 1. Phase I - 16,454 lbs/day rate**
- 2. Phase II - 22,341 lbs/day rate**

**C. DEHPA "DRY" PROCESS**  
**Suggested Batch Cycle Times & Procedure**

**Phase I - 2 Vessels, 16,454 lbs DEHPA per day.**

**Vessel #1 - 4,000 gallon minimum, glass lined.  
Phosphite and Chlorination Reactions.**

<u><b>Time</b></u>	<u><b>Process Steps</b></u>
--------------------	-----------------------------

- |                |  |
|----------------|--|
| <b>30 min.</b> | <b>1. Charge reactor with 12,426 lbs of 2-EHA.<br/>Start the agitator when liquid level is sufficient</b>  |
| <b>105 min</b> | <b>2. Add 4309 lbs of <math>\text{PCl}_3</math> to batch at approximately 42.5 lbs per<br/>minute while controlling reactor temperature at 20°C (charge rate<br/>is dependent on heat removal and HCl evacuation rates)</b>  |
| <b>30 min</b>  | <b>3. Age content while agitated</b>   |
| <b>80 min</b>  | <b>4. Take reactor sample and wait for 2EHA analysis. Excess alcohol<br/>should be 0.5% to 1.2% above theoretical. Sparge the reactor<br/>with nitrogen at 10 CFM during analysis. If an adjustment has<br/>to be made, the reactor will have to be resampled. When<br/>analysis result confirms the excess alcohol range, cool reactor<br/>content to 18°C.</b>   |
| <b>270 min</b> | <b>5. Begin charging chlorine (<math>\text{Cl}_2</math>) into reactor when temperature is<br/>20°C or lower. <math>\text{Cl}_2</math> charge rate is dependent on the reactor<br/>content controlled at 18°C. Chlorination completion is indicated<br/>by the reactor bull's eye monitor showing a green or yellow color<br/>which holds for 5 minutes. Total <math>\text{Cl}_2</math> added approximately 2825<br/>lbs.</b> |
| <b>210 min</b> | <b>6. Take a sample after chlorination. Sparge reactor content for 3 ½<br/>hours with nitrogen (at 30-50 CFM) at 25°C content<br/>temperature. The amount of DEHHP left in the reactor should be<br/>less than 0.5% (DO NOT wait on analysis of sample).</b>   |
| <b>30 min</b>  | <b>7. Transfer the content to the next reactor (4000 gal. G/L'd pre-<br/>charged with water). Record the weight of transferred material.</b>   |

**755 minutes total in vessel #1  
(12.6 Hours)**

Vessel #2 - 4000 gallons minimum, glas-lined. Hydrolysis - Wash/Pyrohydrolysis - Stripping

<u>Time</u>	<u>Process Steps</u>
60 min	1. The 4000 gallon vessel should be pre-loaded with 12,960 lbs of water and heated between 70 ~ 80°C with agitator speed between 100 and 150 ppm.
35 min	2. Transfer chlorinated product (DEHPC containing less than 0.5% DEHHP) into the hydrolysis tank. The agitator should be on and the recycle pump be off when receiving the organic intermediate DEHPC.
90 min	3. Agitate vessel content while maintaining temperature between 80 - 85°C (at 80°C for the first half hour). Samples are to be taken 1 and 1 1/2 hours after completion of organics transfer. Samples are to be analyzed for % HCl.
60 min	4. Stop the agitator immediately after the second sample is taken and allow the content to separate into two liquid phases.
20 min	5. Pump off aqueous layer to 10% HCl system NOTE: The aqueous layer is to be pumped off only after the two HCl analysis results are within 0.2% of each other.
20 min	6. Add 12,238 lbs of water preheated to 90°C to the organic batch (DEHPA) and heat the content to temperatures between 90 and 100°C while agitated but do <u>not</u> circulate.
60 min.	7. Upon reaching 95°C, turn off agitator and allow phase separation for one hour.
15 min	8. Pump off aqueous waste layer to waste effluent or treatment system.
10 min.	9. Add 131 lbs of water to the organic layer.
120 min	10. Agitate and maintain temperature between 95°C to 100°C max (to avoid MEHPA) for two hours. Sample @ 1 1/2 and 2 hours for total acid number. Sampling can be eliminated after routine procedure is established.

- |         |     |  |
|---------|-----|--|
| 60 min. | 11. | Start the vacuum system and open the vacuum vent line on top of the vessel. Strip off the water into the stripper receiver tank by gradually reducing vessel pressure to less than 25 mm. Hg absolute while maintaining temperature at 95°C and hold at these pressure and temperature conditions for half (1/2) hour. |
| 60 min. | 12. | Heat the vessel content to 140°C while maintaining full vacuum for one hour.   |
| 60 min  | 13. | When the vessel temperature reaches 140°C and full vacuum is obtained start a one hour hold.   |
| 60 min  | 14. | Cool the vessel to between 50 ~ 60°C then break vessel vacuum by introducing nitrogen.   |
| 30 min  | 15. | Transfer product into a shift tank.  |
|         | 16. | Transfer organic waste from system to the organics disposal system.  |

---

760 minutes total in vessel #2  
(12.7 Hours)



Phase II - 5 vessels, 22,341 lbs DEHPA per day.

Vessel #1 - Phosphite reactor, 2114 gallons utilized, glass-lined

<u>Time</u>	<u>Process Steps</u>
30 min	1. Charge reactor with 15,776 lbs of alcohol. Start the agitator when liquid level is sufficient.
105 min	2. Add 4309 lbs of $\text{PCl}_3$ at approximately 42.5 lbs per minute while controlling batch temperature at 20°C (Note: charge rate is dependent on heat removal and HCl evacuation rates).
30 min	3. Age batch content while agitated.
80 min	4. Sample batch and wait for 2-EHA analysis. Alcohol should be 0.5% to 2.5% in excess of theoretical. Sparge the reactor with nitrogen at 10 CFM during analysis period. If an adjustment has to be made, the reactor will have to be resampled.
30 min	5. When analysis confirms excess 2-EHA transfer batch to vessel #2 and pump out the entire content.
<hr/> 275 min total	

Vessel #2 - Chlorinator, 1979 gallons utilized, glass lined.

<u>Time</u>	<u>Process Steps</u>
30 min	1. When chlorination reactor is empty, receive batch content from the phosphite reactor including heels. Turn the agitator on when there is sufficient level in the reactor. Circulate the DEHHP thorough chiller to cool at 18°C.
270 min	2. Begin charging chlorine ( $\text{Cl}_2$ ) into the reactor when its content is at 20°C or lower. $\text{Cl}_2$ rate will be dependent on the reactor temperature being kept at 18°C. Chlorination completion is indicated by a greenish yellow color change in the reactors' "bull's eye" viewer for about 5 minutes duration and a 2 to 3°C temperature drop. Total $\text{Cl}_2$ added is approximately 2225 lbs.

- |         |   |
|---------|---|
| 180 min | 3. Take a sample after chlorination. Sparge reactor content with nitrogen for three hours (at 30-50 CFM) to remove HCl gas while temperature is kept at 25°C. The amount of DEHHP - Bis left in the reactor should be less than 0.5% (Do not wait on analysis). |
| 30 min  | 4. Transfer the content to vessel #3 pre-charged with water. Record this weight of transferred material.  |

          
579 min total

Vessel #3 - Hydrolyser, 3532 gallons utilized, glass lined.

Time

Process Steps

- |         |   |
|---------|---|
| 60 min. | 1. When the hydrolysis tank is empty, charge 12,960 lbs of water and heat to 70 ~ 80°C with agitator speed between 100 and 150 rpm.   |
| 35 min. | 2. Transfer chlorinated product (DEHPC with less than 0.5% DEHHP) into the hydrolyzer vessel. The agitator should be on and the recycle pump be off when organic intermediate DEHPC is being received.                                    |
| 90 min  | 3. Agitate vessel content while maintaining temperature between 80 to 85°C (maintain at 80°C for first half hour). Samples are to be taken 1 and 1 1/2 hours after completion of organics transfer. Samples are to be analyzed for % HCl. |
| 60 min  | 4. Stop the agitation immediately after the second sample is taken and allow the content to phase separate.   |
| 20 min  | 5. Pump off aqueous layer to 10% HCl system<br>Note: The aqueous layer is to be pumped off only after the two HCl analysis results are within 0.2% of each other. A dependable detector is important for monitoring interphase.           |
| 30 min  | 6. Transfer the organic content (DEHPA) to vessel #4 and record weight of transferred material.   |

          
295 min total

Vessel #4 - Washing and Pyrohydrolyzer, 3380 gallons utilized, glass-lined.

<u>Time</u>	<u>Process Steps</u>
30 min	1. Transfer organic batch from vessel #3.
20 min	2. Charge 12,238 lbs of water into the vessel, preheated to 90°C.
10 min.	3. Agitate content and heat to temperature between 90 ~ 100°C. Note: DO NOT circulate content.
60 min	4. Upon reaching 95°C turn off agitator immediately and allow phase separation for one hour.
15 min	5. Pump off aqueous waste layer to waste effluent or treatment system.
10 min	6. Add 103 lbs of water to the organic layer.
120 min	7. Agitate and maintain temperature between 95°C and 100°C max to avoid MEHPA and sample 1 1/2 to 2 hours (this sampling can be eliminated after results have been established).

265 Min Total

Vessel #5 - Stripper, 1954 gallons utilized, glass-lined.

<u>Time</u>	<u>Process Steps</u>
30 min	1. Vent the stripper to an aqueous waste receiver tank. Transfer the product batch from vessel #4.
60 min	2. Strip off the water from the product into the stripper receiver tank by gradually reducing vessel pressure to below 25 mmHg absolute while maintaining temperature at 95°C and hold for half (1/2) hour.
60 min	3. Heat the Stripper content to 140°C under full vacuum.
60 min.	4. When the vessel temperature reaches 140°C and full vacuum is obtained start a one hour hold.
60 min	5. Cool the vessel to between 50 ~ 60°C then break vessel vacuum by introducing N <sub>2</sub> .
30 min	6. Transfer product into a shift tank.
	7. Transfer organic waste from system to the organic waste disposal system.

300 min total

**DEHPA PRODUCTION  
OPERATING CONDITION GUIDELINES**

**A. Reaction  $\text{PCl}_3$  + EHA**

$\text{PCl}_3$ charge	4309 lbs
2EHA charge	12,426 lbs
$\text{PCl}_3$ rate	3.5 gpm to 4.0 gpm
Reactor Temp	18°C - 20°C
Analysis EHA( $\text{PCl}_3$ + EHA)	0.4% - 1.2% excess EHA by weight

**B. Chlorination**

Flow Rate $\text{Cl}_2$	2487 cfh
Total $\text{Cl}_2$	4450 ACF (2250 lbs) at 65°C and 32 psig. Look for yellow or green color
Redox reading at completion	Constant valve after $\text{Cl}_2$ feed stops. Range 850 - 1000 mv.
Reactor Temperature	18°C
Color	Light Yellow
Analysis	0.5 B2EHHP (DEHHP)

**C. Hydrolysis**

Water Charge	12,960 $\pm$ 100 lbs
Water Temp	77°C - 83°C
Weight after DEHPC addition	28,488 $\pm$ 100 lbs
Hydro Temp	80°C to 90°C
1st Wash Analysis	Constant %HCl $\pm$ .2%
Separate Phase	1 Hour

**D. Washing**

1st Water Addition	12,238 $\pm$ 100 lbs
Water Temp	90 ~ 95°C
Wash Temp	90°C to 100°C
Phase Separation	1 Hour
2nd Water Addition	103 lbs
Pyrohydrolysis	95 ~ 100°C
Hydrolysis time	2 Hours

**E. Strip**

**Water Strip to Aqueous Waste Tank**

Temperature	95°C max
Pressure	25 mmHg Abs

**EHCI Strip to Organic Waste Tank**

Temperature	135 ~ 140°C
Pressure	10 mmHg

**W.F.E. Strip**

Feed Temp.	125 - 145°C 150°C
Feed Rate	1.2- 2.5 gpm
W.F.E. Pressure	1 - 3 mmHg
Analysis	95 ~ 97% DEHPA

**F. Final Product**

Temperature	< 50°C
Analysis for Transfer	D.E.H.P.A. - 95% Min. M.E.H.P.A. - 3% max.

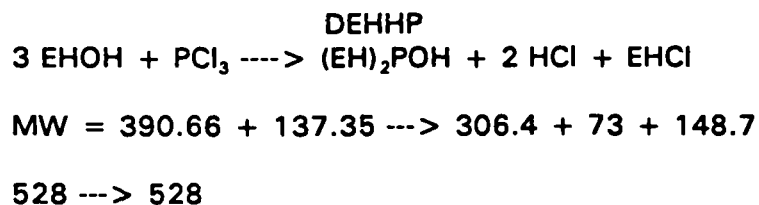
**Deficient  $\text{PCl}_3$  Case (Excess EHOH):**

**Pounds of  $\text{PCl}_3$  to add = [(WT% EHOH in DEHHP X 0.9) - 1] x .0026 x wt of reactor content**

**Use this formula when wt % EHOH in DEHHP is less than 5%.**

**Wt. of reactor contents is 16735 lbs or the total of the amount of  $\text{PCl}_3$  and EHOH added.**

**Above formula is based on the following stoichiometry:**



**HCl evacuated ~ 10% of total weight therefore,**

**DEHHP left in product ~ 90% of total**

**Current recipe specifies 1 % excess EHOH of total charge weight to minimize MEHPA formation and**

**Ratio of  $\text{PCl}_3$  to total reactant (plus EHOH):**

$$\frac{137.35}{137.35 + 390.66} = 0.26$$

**Deficient EHOH case (excess  $\text{PCl}_3$ ):**

**Pounds of EHOH to add = 1.01 x wt %  $\text{PCl}_3$  in DEHHP x 0.9 x .0074 x Wt of Reactor content.**

**Where using the same chemical equation above:**

- a) 1.01 is recipe specification for 1 % excess EHOH**
- b) 0.9 is product (DEHHP) weight after HCl evacuation**
- c) .0074 is to convert percent numbers to decimals and represents the 74% of EHOH in the reactant batch.**

## DEHPA SAMPLE SCHEDULE

Each sample will have the following information on the bottle label:

Sample point

Batch number

Date

Operator's initials

Analysis

4 oz. narrow mouth glass bottles with polyprop cap samples to be taken for:

1. Phosphite Reactor - 1st batch only  
After loading 2-EHA  
Analyze for: H<sub>2</sub>O content
2. Phosphite Reactor - Every batch  
After PCl<sub>3</sub> addition  
Analyze for: 2-EHA  
T2EHPO
3. Chlorinator - Every batch  
After Cl<sub>2</sub> addition  
Analyze for; % DEHHP - BIS - no waiting
4. Organic Scrubber - Start up only  
After start-up  
Analyze per: water and 2 EHCl
5. Hydrolyser - Every batch  
1 and 1 1/2 hours after reaching 80°C  
Analyze for: % HCl (ag)
6. Stripper - Start up only  
1 and 1 1/2 hours after completion of pyrohydrolysis  
Analyze for: Total acid number
7. Stripper - Every batch  
After 2 EHA strip  
Analyze for: % 2-EHCl when approved for  
T2EHOP  
MEHPA  
DEHPA
8. WFE - Every batch  
After Start-up  
Analyze for: 2-EHCl  
2-EHA

- 9.    WFE Every Batch  
      1 hour after leveling  
      Analyze after:       2-EHCl  
                              2-EHA
  
- 10.   Day Tank - Every batch  
      Analyze for: DEHPA yield  
                      MEHPA  
                      TEHPO
  
- 11.   Raw Material approval - Every shipment
  
- 12.   Alcohol storage tank - new shipment
  
- 13.   PCl<sub>3</sub> storage tank - new shipment



**1. PHYSICAL PROPERTIES OF VARIOUS CHEMICALS  
ASSOCIATED WITH DEHPA**

Compound	M.W.	$\rho$ 20/4	Viscosity (cp)	B.P. °C	M.P. °C	Lbs/Gal
PCl <sub>3</sub>	137.3	1.574	0.7	76	-94	13.2
Cl <sub>2</sub> , gas	71.0	2.47 Air = 1	0.35	-35	-102	
HCl, gas	36.5	1.27 Air = 1	0.0130(0°C) 0.0140(20°C)	-85	-111	
2-Ethylhexyl Alcohol	130.2	0.833	10 @ 19°C 31 @ 0°C	184	-70	6.9
2-Ethylhexyl Chloride	148.7	0.867	0.92 @ 28°C	169	<0	7.37
BEHHP	306.4	0.937	6.1 @ 25°C 4.4 @ 40°C	163 @ 3mm	<0	7.78
DEHPC	340.9	0.982	8.3 @ 28°C	150 0.3mm estimate	<0	8.2
DEHPA	322.4	0.977	53 @ 20°C	>>125 1mm	-60 (Glass)	8.1

## 2. HEAT OF REACTION

<u>REACTION</u>	<u>ΔHr Basis</u>	<u>ΔHr cal/g</u>	
		<u>Calculated</u>	<u>Experimental</u>
$\text{PCl}_3 + 3\text{EHOH} \text{ ----> } \text{BEHHP} + \text{EHCl} + 2\text{HCl}$	$\text{PCl}_3$	210	146 (264 Btu/lb $\text{PCl}_3$ )
$\text{DEHHP} + \text{Cl}_2 \text{ -----> } \text{DEHPC} + \text{HCl}$	BEHHP	152	150 (270 Btu/lb DEHHP)
$\text{DEHPC} + \text{H}_2\text{O} \text{ ----> } \text{DEHPA} + \text{HCl}$	DEHPC	18	(18 Btu/lb DEHPC)

## Di(2-Ethylhexyl) Phosphoric Acid

### Typical Properties

Formula	$[\text{C}_4\text{H}_9\text{CH}(\text{C}_2\text{H}_5)]\text{CH}_2\text{O}]_2\text{P}(\text{O})\text{OH}$
Molecular Weight	322.4 DEHPA
Composition	
% Diester DEHPA	95 -97
% Monoester	1.5 - 30
Acid Number, mg KOH/g	170 - 180
Specific Gravity @ 20/20°C	0.96 - 0.99
Refractive Index $n_D$ 20°C	1.440 - 1.444
Color	colorless - straw Gardner 1 ~ 5, typical 1 ~ 2
Viscosity @ 20°C, cps	50
Flash Point, °C (Tag closed cup)	150
Autoignition Temperature, °C	327
Vapor pressure	< < 1 mm at 150°C
Solubility in water, %	<0.01
Water solubility in, %	2.4
Freezing Point, °C	<-60
Appearance	clear, free of solids
Weight/gal. lbs. @ 20°C	8.1
Coefficient of Expansion per °C at 55°C	0.0008
Boiling Point	Decompose
D.O.T. Hazard Classification	Corrosive

## CORROSION DATA

Corrosion data for DEHPA are summarized below:

<u>Metal</u>	<u>Inches/Year</u>	
	<u>Ambient</u>	<u>80°C</u>
Aluminum	0.0001	<0.0001
Brass P-87	0.0002	0.0001
Bronze P-85	0.0015	0.0004
Copper	0.0003	0.0002
Hastelloy D	0.0001	<0.0001
Lead	0.0066	0.0013
Monel	0.0002	<0.0001
Nickel	0.0002	<0.0001
Carbon Steel	0.0013	0.0003
Stainless Steel 16	<0.0001	<0.0001
Stainless Steel 304	<0.0001	<0.0001

<u>Misc.</u>	<u>Ambient</u>	<u>50°C</u>	<u>80°C</u>
Haveg 41	+0.6657		-0.0226
Haveg 60	+0.0003		-0.129
Hageg 7710	-0.0013		-0.0060
Lithcote LC-24	no change	no change	
Mobiliner 20 Olive	no change	no change	

The MRDC corrosion group at Paulsboro, N.J. recommended Hastelloy C-276 for DEHPA manufacture, based on its resistance to chlorine and HCl corrosion.

## **GLOSSARY**

<b>HTPP</b>	<b>High Temperature Phosphate Products</b>
<b>DEHPA</b>	<b>Di - (2-Ethylhexyl) Phosphoric Acid</b>
<b>TMP</b>	<b>Trimethyl Phosphite</b>
<b>TEHP</b>	<b>Tri-(2-Ethylhexyl) Phosphite</b>
<b>BEHHP</b>	<b>Di-(2-Ethylhexyl) Hydrogen Phosphite</b>
<b>DEHPC</b>	<b>Di-(2-Ethylhexyl) Phosphorochloridate</b>
<b>TMPO</b>	<b>Trimethyl Phosphate</b>
<b>TEHPO</b>	<b>TRi-(2-Ethylhexyl) Phosphate</b>
<b>MEMPO</b>	<b>Mono-(2-Ethylhexyl) Phosphoric Acid</b>
<b>TEHPP</b>	<b>Tetra-(2-Ethylhexyl) Pyrophosphate</b>
<b>EHCI</b>	<b>2-Ethylhexyl Chloride</b>
<b>EHOH</b>	<b>2-Ethylhexanol</b>
<b>TOPO</b>	<b>Trioctylphoshine Oxide</b>

**EXHIBIT F**

**DEHPA RAW MATERIAL YIELDS USAGE PER POUND OF DEHPA PRODUCT**

## EXHIBIT F

### DEHPA RAW MATERIAL YIELDS USAGE PER POUND OF DEHPA PRODUCT

<u>Raw Material</u>	<u>USAGE</u> <u>(lbs. R.M./lb DEHPA)</u>	
PCl <sub>3</sub>	0.4413	(96.5%)
2-EHA	1.2726	(95.8%)
Cl <sub>2</sub>	0.2279	(96.5%)

**EXHIBIT G**

**MATERIAL SAFETY DATA BULLETINS  
FOR  
RAW MATERIALS AND INTERMEDIATES**

**RAW MATERIALS:**

**PHOSPHORUS TRICHLORIDE  
2-ETHYLHEXANOL  
CHLORINE**

**INTERMEDIATES AND BY-PRODUCTS:**

**Di(2-ETHYLHEXYL) PHOSPHOROCHLORIDATE  
Bis(2-ETHYLHEXYL) HYDROGEN PHOSPHITE  
2-ETHYLHEXYL CHLORIDE  
HYDROCHLORIC ACID**



ALBRIGHT & WILSON AMERICAS INC.  
ENVIRONMENTAL SERVICES

P. O. BOX 26229  
RICHMOND, VA. 23260-6229 (USA)

\*\*\*\*\* PRODUCT IDENTIFICATION \*\*\*\*\*  
ALBRITE PHOSPHORUS TRICHLORIDE

SUPPLIER: ALBRIGHT & WILSON INC.	HEALTH EMERGENCY TELEPHONE: (803)554-1229
CHEMICAL NAMES AND SYNONYMS: PHOSPHORUS, TRICHLORIDE	TRANSPORT EMERGENCY TELEPHONE: (800)424-9300(CHEMTREC)
USE OR DESCRIPTION: CHEMICAL RAW MATERIAL	OTHER DESIGNATION: 771

\*\*\*\*\* TYPICAL CHEMICAL AND PHYSICAL PROPERTIES \*\*\*\*\*

APPEARANCE: CLEAR LIQUID	VISCOSITY: AT 100 F, SUS NE	AT 40 C, CS NE
ODOR: PUNGENT, ACRID	VISCOSITY: AT 210 F, SUS NE	AT 100 C, CS NE
RELATIVE DENSITY: 15/4 C 1.585	SOLUBILITY IN WATER: HIGHLY REACTIVE	PH: NA
MELTING POINT: F(C) NE	POUR POINT: F(C) NA	
BOILING POINT: F(C) 168(76)	FLASH POINT: F(C) (METHOD) NA	
VAPOR PRESSURE:MM HG 20C 100.0		

NA=NOT APPLICABLE    NE=NOT ESTABLISHED    D=DECOMPOSES  
\*\*\*\*\* INGREDIENTS \*\*\*\*\*

	WT PCT (APPROX)	PEL MG/M3	PPM	TLV(TWA) MG/M3	PPM
HAZARDOUS INGREDIENTS:  PHOSPHORUS TRICHLORIDE (7719-12-2)	99.5+	3.0	0.5	1.5	0.2

NOTE: TLVS SHOWN FOR GUIDANCE ONLY. FOLLOW APPLICABLE REGULATIONS.

INFORMATION GIVEN HEREIN IS OFFERED IN GOOD FAITH AS ACCURATE, BUT WITHOUT GUARANTEE. CONDITIONS OF USE AND SUITABILITY OF THE PRODUCT FOR PARTICULAR USES ARE BEYOND OUR CONTROL; ALL RISKS OF USE OF THE PRODUCT ARE THEREFORE ASSUMED BY THE USER AND WE EXPRESSLY DISCLAIM ALL WARRANTIES OF EVERY KIND AND NATURE, INCLUDING WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE IN RESPECT TO THE USE OR SUITABILITY OF THE PRODUCT. NOTHING IS INTENDED AS A RECOMMENDATION FOR USES WHICH INFRINGE VALID PATENTS OR AS EXTENDING LICENSE UNDER VALID PATENTS. APPROPRIATE WARNINGS AND SAFE HANDLING PROCEDURES SHOULD BE PROVIDED TO HANDLERS AND USERS.

CONDITIONS TO AVOID:  
NE

## \*\*\*\*\* SPILL OR LEAK PROCEDURE \*\*\*\*\*

## ENVIRONMENTAL IMPACT:

REPORT SPILLS AS REQUIRED TO APPROPRIATE AUTHORITIES. U.S. COAST GUARD REGULATIONS REQUIRE IMMEDIATE REPORTING OF SPILLS THAT COULD REACH ANY WATERWAY, INCLUDING INTERMITTENT DRY CREEKS. REPORT SPILL TO COAST GUARD TOLL FREE NUMBER 800-424-8802. IN CASE OF ACCIDENT OR ROAD SPILL, NOTIFY CHEMTREC (800) 424-9300.

## PROCEDURES IF MATERIAL IS RELEASED OR SPILLED:

PERSONNEL PERFORMING CLEANUP MUST USE PROTECTIVE EQUIPMENT. ABSORB ON FIRE RETARDANT TREATED SAWDUST, DIATOMACEOUS EARTH, ETC. SHOVEL UP AND DISPOSE OF AT AN APPROPRIATE WASTE DISPOSAL FACILITY IN ACCORDANCE WITH CURRENT APPLICABLE LAWS AND REGULATIONS, AND PRODUCT CHARACTERISTICS AT TIME OF DISPOSAL.

## WASTE MANAGEMENT:

SLOWLY ADD WASTE TO A LARGE VOLUME OF AGITATED SOLUTION OF SODA ASH AND SLAKED LIME. DISSOLVE IN A LARGE VOLUME OF WATER. DISPOSE OF WASTE AT AN APPROPRIATE WASTE DISPOSAL FACILITY IN ACCORDANCE WITH CURRENT APPLICABLE LAWS AND REGULATIONS, AND PRODUCT CHARACTERISTICS AT TIME OF DISPOSAL.

## \*\*\*\*\* SPECIAL PROTECTION INFORMATION \*\*\*\*\*

## EYE PROTECTION:

CHEMICAL TYPE GOGGLES WITH FACE SHIELD MUST BE WORN.

## SKIN PROTECTION:

PROTECTIVE CLOTHING SUCH AS UNIFORMS, COVERALLS OR LAB COATS SHOULD BE WORN. IMPERVIOUS GLOVES AND APRONS MUST BE WORN. WHEN HANDLING LARGE QUANTITIES, IMPERVIOUS SUITS AND BOOTS MUST BE WORN.

## RESPIRATORY PROTECTION:

APPROVED RESPIRATORY PROTECTIVE EQUIPMENT MUST BE USED WHEN VAPOR OR MIST CONCENTRATIONS EXCEED APPLICABLE STANDARDS. ACID CANNISTER GAS MASKS ARE STRONGLY RECOMMENDED WHEN EXPOSED TO ANY CONCENTRATION OF VAPORS AND/OR MISTS.

## VENTILATION:

NO SPECIAL REQUIREMENTS UNDER ORDINARY CONDITIONS OF USE AND WITH ADEQUATE VENTILATION. USE IN WELL VENTILATED AREA WITH LOCAL EXHAUST VENTILATION.

OTHER: PRIMARY ROUTE OF ENTRY - INHALATION.

## \*\*\*\*\* SPECIAL PRECAUTIONS \*\*\*\*\*

## HANDLING:

AVOID INHALATION OF VAPORS OR MISTS. AVOID INGESTION. AVOID ALL PERSONAL CONTACT.

## STORAGE:

SEE APPENDIX FOR PRECAUTIONARY LABEL. ICG-771

STORED MATERIALS MUST BE LABELED AS: PHOSPHORUS TRICHLORIDE.

THIS PRODUCT IS CLASSIFIED AS A CORROSIVE LIQUID, UN 1809,  
POISON-INHALATION HAZARD BY DOT.

## \*\*\*\*\* HEALTH HAZARD DATA \*\*\*\*\*

## ACUTE HEALTH HAZARDS

CORROSIVE, ORAL, DERMAL, AND INHALATION TOXIC

## CARCINOGENICITY

LISTED: NTP NO IARC MONOGRAPHS NO OSHA REGULATED NO

## SIGNS AND SYMPTOMS OF EXPOSURE:

RESPIRATORY, SKIN AND EYE IRRITATION

## MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE:

NONE KNOWN

## SUBACUTE AND MUTAGENICITY (SUMMARY)

AMES TEST: NEGATIVE

## CHRONIC OR SPECIALIZED (SUMMARY)

NONE KNOWN

## OTHER DATA

NONE

\*\*\*\*\* WARNING STATEMENTS \*\*\*\*\*

CALIFORNIA:

"WARNING: THIS PRODUCT MAY CONTAIN A CHEMICAL KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER, OR BIRTH DEFECTS OR OTHER REPRODUCTIVE HARM".

ALL PHOSPHORUS COMPOUNDS MAY BE REASONABLY EXPECTED TO CONTAIN ARSENIC AND POSSIBLY CADMIUM AND/OR LEAD IN CONCENTRATIONS RANGING FROM A FEW PARTS PER BILLION TO A FEW PARTS PER MILLION.



## \*\*\*\*\* FIRE AND EXPLOSION HAZARD DATA \*\*\*\*\*

FLASH POINT: F(C) (METHOD)      FLAMMABLE LIMITS: LEL      UEL  
200 (93)      (ASTM D-56)      NE      NE

## EXTINGUISHING MEDIA:

CARBON DIOXIDE, FOAM, DRY CHEMICAL AND WATER FOG.

## SPECIAL FIRE FIGHTING PROCEDURES:

FIREFIGHTERS MUST USE SELF-CONTAINED BREATHING APPARATUS.

## UNUSUAL FIRE AND EXPLOSION HAZARDS:

EXPOSURE TO FIRE CAN GENERATE HIGHLY TOXIC FUMES.

## \*\*\*\*\* EMERGENCY AND FIRST AID PROCEDURES \*\*\*\*\*

## EYE CONTACT:

FLUSH THOROUGHLY WITH WATER FOR AT LEAST 15 MINUTES. GET MEDICAL ASSISTANCE.

## SKIN CONTACT:

WASH CONTACT AREAS WITH SOAP AND WATER.

## INHALATION:

NOT EXPECTED TO BE A PROBLEM.\*\*\*\*\*

## INGESTION:

DO NOT INDUCE VOMITING. ADMINISTER VEGETABLE OIL. GET MEDICAL ASSISTANCE. (NOTE TO PHYSICIAN: MATERIAL IF ASPIRATED INTO THE LUNGS MAY CAUSE CHEMICAL PNEUMONITIS. TREAT APPROPRIATELY)

## \*\*\*\*\* REACTIVITY DATA \*\*\*\*\*

STABILITY: (THERMAL, LIGHT, ETC.)      CONDITIONS TO AVOID:  
STABLE      EXTREME HEAT

## INCOMPATIBILITY: (MATERIALS TO AVOID)

STRONG OXIDIZERS AND WATER

## HAZARDOUS DECOMPOSITION PRODUCTS:

PHOSPHORUS OXIDES, CHLORIDES AND CARBON MONOXIDE

## HAZARDOUS POLYMERIZATION:

CONDITIONS TO AVOID:

WILL NOT OCCUR

NE

## \*\*\*\*\* SPILL OR LEAK PROCEDURE \*\*\*\*\*

## ENVIRONMENTAL IMPACT:

REPORT SPILLS AS REQUIRED TO APPROPRIATE AUTHORITIES. REGULATIONS REQUIRE IMMEDIATE REPORTING OF SPILLS THAT COULD REACH ANY WATERWAY, INCLUDING INTERMITTENT DRY CREEKS. REPORT SPILL TO NATIONAL RESPONSE CENTER TOLL FREE NUMBER 800-424-8802. IN CASE OF ACCIDENT OR ROAD SPILL, NOTIFY CHEMTREC (800) 424-9300.

## PROCEDURES IF MATERIAL IS RELEASED OR SPILLED:

ABSORB ON FIRE RETARDANT TREATED SAWDUST, DIATOMACEOUS EARTH, ETC. SCRAPE UP AND REMOVE. DISPOSE OF AT AN APPROPRIATE WASTE DISPOSAL FACILITY IN ACCORDANCE WITH CURRENT APPLICABLE LAWS AND REGULATIONS, AND PRODUCT CHARACTERISTICS AT TIME OF DISPOSAL.

## WASTE MANAGEMENT:

DISSOLVE WASTE IN A SOLVENT AND DISPOSE BY SUPERVISED INCINERATION IN COMPLIANCE WITH APPLICABLE LAWS AND REGULATIONS.

## \*\*\*\*\* SPECIAL PROTECTION INFORMATION \*\*\*\*\*

## EYE PROTECTION:

NO SPECIAL EQUIPMENT REQUIRED.

## SKIN PROTECTION:

NO SPECIAL EQUIPMENT REQUIRED. HOWEVER, GOOD PERSONAL HYGIENE PRACTICES SHOULD ALSO BE FOLLOWED.

## RESPIRATORY PROTECTION:

NO SPECIAL REQUIREMENTS UNDER ORDINARY CONDITIONS OF USE AND WITH ADEQUATE VENTILATION. APPROVED RESPIRATORY PROTECTIVE EQUIPMENT MUST BE USED IN HIGH VAPOR OR MIST CONCENTRATIONS.

## VENTILATION:

NO SPECIAL REQUIREMENTS UNDER ORDINARY CONDITIONS OF USE AND WITH ADEQUATE VENTILATION.

## OTHER:

## \*\*\*\*\* SPECIAL PRECAUTIONS \*\*\*\*\*

## HANDLING:

AVOID PERSONAL CONTACT.

## STORAGE:

STORE IN COOL AREA.

STORED MATERIALS MUST BE LABELED AS: O,O-DI(2-ETHYLHEXYL) PHOSPHOROCHLORIDATE  
COMBUSTIBLE



## \*\*\*\*\* HEALTH HAZARD DATA \*\*\*\*\*

## ACUTE HEALTH HAZARDS:

A MILD IRRITANT TO SKIN AND EYES; INHALATION OF MISTS MAY LEAD TO RESPIRATORY EFFECTS.

## CARCINOGENICITY:

LISTED: NTP? NO IARC MONOGRAPHS? NO OSHA REGULATED? NO

## SIGNS AND SYMPTOMS OF EXPOSURE:

POSSIBLE REDNESS OR ITCHING OF SKIN AND EYES; LABORED BREATHING MAY RESULT AFTER INHALATION OF MISTS.

## MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE:

POSSIBLE RESPIRATORY DISEASES; POSSIBLE SKIN DISEASES.

## SUBACUTE AND MUTAGENICITY (SUMMARY)

NEGATIVE AMES TEST

## CHRONIC OR SPECIALIZED (SUMMARY)

NO CHOLINESTERASE EFFECTS ARE REPORTED AFTER DERMAL APPLICATIONS IN RATS.

## TARGET ORGAN EFFECTS

SKIN AND EYES IRRITATIONS; RESPIRATORY TRACTS (MIST INHALATION)

## OTHER DATA

NONE KNOWN

\*\*\*\*\* WARNING STATEMENTS \*\*\*\*\*

N/A

ALBRIGHT & WILSON AMERICAS INC.  
ENVIRONMENTAL SERVICES

P. O. BOX 26229  
RICHMOND, VA. 23260-6229 (USA)

\*\*\*\*\* PRODUCT IDENTIFICATION \*\*\*\*\*  
ALBRITE BIS(2-ETHYLHEXYL) HYDROGEN PHOSPHITE

SUPPLIER: ALBRIGHT & WILSON INC.	HEALTH EMERGENCY TELEPHONE: (803)554-1229
CHEMICAL NAMES AND SYNONYMS: ORGANOPHOSPHITES	TRANSPORT EMERGENCY TELEPHONE: (800)424-9300(CHEMTREC)
USE OR DESCRIPTION: INDUSTRIAL CHEMICAL	OTHER DESIGNATION: 906

\*\*\*\*\* TYPICAL CHEMICAL AND PHYSICAL PROPERTIES \*\*\*\*\*

APPEARANCE: LIQUID	VISCOSITY: AT 100 F, SUS 41.0	AT 40 C, CS 4.7
ODOR: MILD	VISCOSITY: AT 210 F, SUS <26.0	AT 100 C, CS 1.6
RELATIVE DENSITY: 15/4 C 0.94	SOLUBILITY IN WATER: NEGLIGIBLE	PH: NE
MELTING POINT: F(C) NA	POUR POINT: F(C) NE	
BOILING POINT: F(C) 293(145) AT 3 MM HG	FLASH POINT: F(C) (METHOD) 304 F (SETAFLASH CC)	
VAPOR PRESSURE:MM HG 20C NE		

NA=NOT APPLICABLE    NE=NOT ESTABLISHED    D=DECOMPOSES

\*\*\*\*\* INGREDIENTS \*\*\*\*\*

	WT PCT (APPROX)	PEL MG/M3	PPM	TLV(TWA) MG/M3	PPM
HAZARDOUS INGREDIENTS:					
BIS(2-ETHYLHEXYL) HYDROGEN PHOSPHITE (3658-48-8)	94	NE	NE	NE	NE
2-ETHYLHEXYL ALCOHOL (104-76-7)	6	NE	NE	NE	NE

NOTE: TLVS SHOWN FOR GUIDANCE ONLY. FOLLOW APPLICABLE REGULATIONS.

INFORMATION GIVEN HEREIN IS OFFERED IN GOOD FAITH AS ACCURATE, BUT WITHOUT GUARANTEE. CONDITIONS OF USE AND SUITABILITY OF THE PRODUCT FOR PARTICULAR USES ARE BEYOND OUR CONTROL; ALL RISKS OF USE OF THE PRODUCT ARE THEREFORE ASSUMED BY THE USER AND WE EXPRESSLY DISCLAIM ALL WARRANTIES OF EVERY KIND AND NATURE, INCLUDING WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE IN RESPECT TO THE USE OR SUITABILITY OF THE PRODUCT. NOTHING IS INTENDED AS A RECOMMENDATION FOR USES WHICH INFRINGE VALID PATENTS OR AS EXTENDING LICENSE UNDER VALID PATENTS. APPROPRIATE WARNINGS AND SAFE HANDLING PROCEDURES SHOULD BE PROVIDED TO HANDLERS AND USERS.

## \*\*\*\*\* FIRE AND EXPLOSION HAZARD DATA \*\*\*\*\*

FLASH POINT: F(C) (METHOD)      FLAMMABLE LIMITS: LEL      UEL  
304 F (SETAFLASH CC)      NE  
EXTINGUISHING MEDIA:  
CARBON DIOXIDE, FOAM, DRY CHEMICAL AND WATER FOG.  
SPECIAL FIRE FIGHTING PROCEDURES:  
FIREFIGHTERS MUST USE RECOMMENDED PROTECTIVE EQUIPMENT AND SELF-  
CONTAINED BREATHING APPARATUS.

## UNUSUAL FIRE AND EXPLOSION HAZARDS:

EXPOSURE TO FIRE CAN GENERATE HIGHLY TOXIC FUMES.

## \*\*\*\*\* EMERGENCY AND FIRST AID PROCEDURES \*\*\*\*\*

## EYE CONTACT:

FLUSH THOROUGHLY WITH WATER FOR AT LEAST 15 MINUTES. GET  
IMMEDIATE MEDICAL ASSISTANCE. IF MEDICAL ASSISTANCE IS NOT IMMEDIATELY  
AVAILABLE, FLUSH AN ADDITIONAL 15 MINUTES.

## SKIN CONTACT:

WASH CONTACT AREAS WITH SOAP AND LARGE AMOUNTS OF WATER.  
IF IRRITATION DEVELOPS, SEEK MEDICAL ASSISTANCE.  
LAUNDER CONTAMINATED CLOTHING BEFORE REUSE.

## INHALATION:

NOT EXPECTED TO BE A PROBLEM.

## INGESTION:

DO NOT INDUCE VOMITING. ADMINISTER VEGETABLE OIL. GET  
MEDICAL ASSISTANCE. (NOTE TO PHYSICIAN: MATERIAL IF ASPIRATED INTO THE  
LUNGS MAY CAUSE CHEMICAL PNEUMONITIS. TREAT APPROPRIATELY)

## \*\*\*\*\* REACTIVITY DATA \*\*\*\*\*

## STABILITY: (THERMAL, LIGHT, ETC.) CONDITIONS TO AVOID:

STABLE      HEAT, STRONG OXIDATION, AND WATER

## INCOMPATIBILITY: (MATERIALS TO AVOID)

STRONG OXIDIZERS

## HAZARDOUS DECOMPOSITION PRODUCTS:

PHOSPHORUS OXIDES. CARBON MONOXIDE.

## HAZARDOUS POLYMERIZATION:

## CONDITIONS TO AVOID:

WILL NOT OCCUR

NE

\*\*\*\*\* SPILL OR LEAK PROCEDURE \*\*\*\*\*  
ENVIRONMENTAL IMPACT:

REPORT SPILLS AS REQUIRED TO APPROPRIATE AUTHORITIES. U. S. COAST GUARD REGULATIONS REQUIRE IMMEDIATE REPORTING OF SPILLS THAT COULD REACH ANY WATERWAY INCLUDING INTERMITTENT DRY CREEKS. REPORT SPILL TO COAST GUARD TOLL FREE NUMBER 800-424-8802. IN CASE OF ACCIDENT OR ROAD SPILL NOTIFY CHEMTREC (800) 424-9300.

PROCEDURES IF MATERIAL IS RELEASED OR SPILLED:

PERSONNEL PERFORMING CLEANUP MUST USE PROTECTIVE EQUIPMENT. ADSORB ON FIRE RETARDANT TREATED SAWDUST, DIATOMACEOUS EARTH, ETC. SHOVEL UP AND DISPOSE OF AT AN APPROPRIATE WASTE DISPOSAL FACILITY IN ACCORDANCE WITH CURRENT APPLICABLE LAWS AND REGULATIONS, AND PRODUCT CHARACTERISTICS AT TIME OF DISPOSAL.

WASTE MANAGEMENT:

DISSOLVE WASTE IN A SOLVENT AND DISPOSE BY SUPERVISED INCINERATION IN COMPLIANCE WITH APPLICABLE LAWS AND REGULATIONS.

\*\*\*\*\* SPECIAL PROTECTION INFORMATION \*\*\*\*\*

EYE PROTECTION:

CHEMICAL TYPE GOGGLES MUST BE WORN.

SKIN PROTECTION:

IMPERVIOUS GLOVES SHOULD BE WORN. WHEN HANDLING LARGE QUANTITIES, PROTECTIVE CLOTHING SHOULD BE WORN.

RESPIRATORY PROTECTION:

NO SPECIAL REQUIREMENTS UNDER ORDINARY CONDITIONS OF USE AND WITH ADEQUATE VENTILATION. APPROVED RESPIRATORY PROTECTIVE EQUIPMENT MUST BE USED IN HIGH VAPOR OR MIST CONCENTRATIONS.

VENTILATION:

NO SPECIAL REQUIREMENTS UNDER ORDINARY CONDITIONS OF USE AND WITH ADEQUATE VENTILATION.

OTHER: PRIMARY ROUTE OF ENTRY-SKIN CONTACT

\*\*\*\*\* SPECIAL PRECAUTIONS \*\*\*\*\*

HANDLING: AVOID CONTACT WITH EYES. AVOID CONTACT WITH SKIN.

STORAGE: NO SPECIAL REQUIREMENTS.

STORED MATERIALS MUST BE LABELED AS: BIS(2-ETHYLHEXYL)HYDROGEN PHOSPHITE.

THIS PRODUCT IS CLASSIFIED AS NOT RESTRICTED BY DOT.

## \*\*\*\*\* HEALTH HAZARD DATA \*\*\*\*\*

## ACUTE HEALTH HAZARDS

IRRITANT

## CARCINOGENICITY

LISTED: NTP NO IARC MONOGRAPHS NO OSHA REGULATED NO

## SIGNS AND SYMPTOMS OF EXPOSURE:

SKIN AND EYE IRRITATION

## MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE:

NONE KNOWN

## SUBACUTE AND MUTAGENICITY (SUMMARY)

REPORTED TO BE MUTAGENIC: 2-ETHYLHEXYL ALCOHOL  
AMES TEST: NEGATIVE

## CHRONIC OR SPECIALIZED (SUMMARY)

NE

## TARGET ORGAN EFFECTS

EYE, SKIN, MUCOUS MEMBRANE--MILD IRRITANT

## OTHER DATA

REPORTED POSSIBLE CARCINOGEN: 2-ETHYLHEXYL ALCOHOL  
SELECTED FOR CARCINOGENITY STUDY, 4/85, NTP: 2-ETHYLHEXANOL

## \*\*\*\*\* WARNING STATEMENTS \*\*\*\*\*

CALIFORNIA:

"WARNING: THIS PRODUCT MAY CONTAIN A CHEMICAL KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER, OR BIRTH DEFECTS OR OTHER REPRODUCTIVE HARM".

ALL PHOSPHORUS COMPOUNDS MAY BE REASONABLY EXPECTED TO CONTAIN ARSENIC AND POSSIBLY CADMIUM AND/OR LEAD IN CONCENTRATIONS RANGING FROM A FEW PARTS PER BILLION TO A FEW PARTS PER MILLION.

ALBRIGHT & WILSON AMERICAS INC.  
ENVIRONMENTAL SERVICES

P. O. BOX 26229  
RICHMOND, VA. 23260-6229 (USA)

\*\*\*\*\* PRODUCT IDENTIFICATION \*\*\*\*\*  
2-ETHYLHEXYL CHLORIDE

SUPPLIER: ALBRIGHT & WILSON INC.	HEALTH EMERGENCY TELEPHONE: (803)554-1229
CHEMICAL NAMES AND SYNONYMS: ETHYLHEXYL CHLORIDE, 2-	TRANSPORT EMERGENCY TELEPHONE: (800)424-9300(CHEMTREC)
USE OR DESCRIPTION: CHEMICAL RAW MATERIAL	OTHER DESIGNATION: 989

\*\*\*\*\* TYPICAL CHEMICAL AND PHYSICAL PROPERTIES \*\*\*\*\*

APPEARANCE: WATER-WHITE LIQUID	VISCOSITY: AT 100 F, SUS NE	AT 40 C, CS NE
ODOR: MILD	VISCOSITY: AT 210 F, SUS NE	AT 100 C, CS NE
RELATIVE DENSITY: 15/4 C 0.88	SOLUBILITY IN WATER: NEGLIGIBLE	PH: NA
MELTING POINT: F(C) NA	POUR POINT: F(C) NE	
BOILING POINT: F(C) 339(171)	FLASH POINT: F(C) (METHOD) 140(60) (OPEN CUP)	
VAPOR PRESSURE:MM HG 20C 1.1		

NA=NOT APPLICABLE    NE=NOT ESTABLISHED    D=DECOMPOSES

\*\*\*\*\* INGREDIENTS \*\*\*\*\*

	WT PCT (APPROX)	PEL MG/M3	PPM	TLV(TWA) MG/M3	PPM
HAZARDOUS INGREDIENTS:  2-ETHYLHEXYL CHLORIDE (123-04-6)	96	NE	NE	NE	NE

NOTE: TLVS SHOWN FOR GUIDANCE ONLY. FOLLOW APPLICABLE REGULATIONS.

INFORMATION GIVEN HEREIN IS OFFERED IN GOOD FAITH AS ACCURATE, BUT WITHOUT GUARANTEE. CONDITIONS OF USE AND SUITABILITY OF THE PRODUCT FOR PARTICULAR USES ARE BEYOND OUR CONTROL; ALL RISKS OF USE OF THE PRODUCT ARE THEREFORE ASSUMED BY THE USER AND WE EXPRESSLY DISCLAIM ALL WARRANTIES OF EVERY KIND AND NATURE, INCLUDING WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE IN RESPECT TO THE USE OR SUITABILITY OF THE PRODUCT. NOTHING IS INTENDED AS A RECOMMENDATION FOR USES WHICH INFRINGE VALID PATENTS OR AS EXTENDING LICENSE UNDER VALID PATENTS. APPROPRIATE WARNINGS AND SAFE HANDLING PROCEDURES SHOULD BE PROVIDED TO HANDLERS AND USERS.



## \*\*\*\*\* FIRE AND EXPLOSION HAZARD DATA \*\*\*\*\*

FLASH POINT: F(C) (METHOD)      FLAMMABLE LIMITS: LEL      UEL  
140(60) (OPEN CUP)      NE      NE  
EXTINGUISHING MEDIA:  
CARBON DIOXIDE, FOAM, DRY CHEMICAL AND WATER FOG.  
SPECIAL FIRE FIGHTING PROCEDURES:  
FIREFIGHTERS MUST USE SELF-CONTAINED BREATHING APPARATUS.

UNUSUAL FIRE AND EXPLOSION HAZARDS:  
NONE KNOWN

## \*\*\*\*\* EMERGENCY AND FIRST AID PROCEDURES \*\*\*\*\*

## EYE CONTACT:

FLUSH WITH WATER FOR AT LEAST 15 MINUTES. IF IRRITATION DEVELOPS,  
SEEK MEDICAL ASSISTANCE.

## SKIN CONTACT:

WASH CONTACT AREAS WITH SOAP AND WATER. IF IRRITATION DEVELOPS,  
SEEK MEDICAL ASSISTANCE. LAUNDRY CONTAMINATED CLOTHING BEFORE REUSE.

## INHALATION:

REMOVE FROM FURTHER EXPOSURE. IF UNCONSCIOUSNESS OCCURS, SEEK IMMEDIATE  
MEDICAL ASSISTANCE AND CALL A PHYSICIAN. IF BREATHING HAS STOPPED, USE MOUTH  
TO MOUTH RESUSCITATION.

## INGESTION:

NOT EXPECTED TO BE A PROBLEM. HOWEVER, IF GREATER THAN 1/2 LITER(PINT)  
INGESTED, IMMEDIATELY GIVE 1 TO 2 GLASSES OF WATER AND CALL A PHYSICIAN,  
HOSPITAL EMERGENCY ROOM OR POISON CONTROL CENTER FOR ASSISTANCE. DO NOT  
INDUCE VOMITING OR GIVE ANYTHING BY MOUTH TO AN UNCONSCIOUS PERSON.

## \*\*\*\*\* REACTIVITY DATA \*\*\*\*\*

STABILITY: (THERMAL, LIGHT, ETC.)      CONDITIONS TO AVOID:  
STABLE      NONE

INCOMPATIBILITY: (MATERIALS TO AVOID)  
STRONG OXIDIZERS

## HAZARDOUS DECOMPOSITION PRODUCTS:

CHLORIDES. PHOSGENE. CARBON MONOXIDE.

HAZARDOUS POLYMERIZATION:  
WILL NOT OCCUR

CONDITIONS TO AVOID:  
NE

## \*\*\*\*\* SPILL OR LEAK PROCEDURE \*\*\*\*\*

## ENVIRONMENTAL IMPACT:

REPORT SPILLS AS REQUIRED TO APPROPRIATE AUTHORITIES. U.S. COAST GUARD REGULATIONS REQUIRE IMMEDIATE REPORTING OF SPILLS THAT COULD REACH ANY WATERWAY, INCLUDING INTERMITTENT DRY CREEKS. REPORT SPILL TO COAST GUARD TOLL FREE NUMBER 800-424-8802. IN CASE OF ACCIDENT OR ROAD SPILL, NOTIFY CHEMTREC (800) 424-9300.

## PROCEDURES IF MATERIAL IS RELEASED OR SPILLED:

ABSORB ON FIRE RETARDANT TREATED SAWDUST, DIATOMACEOUS EARTH, ETC. SCRAPE UP AND REMOVE. DISPOSE OF AT AN APPROPRIATE WASTE DISPOSAL FACILITY IN ACCORDANCE WITH CURRENT APPLICABLE LAWS AND REGULATIONS, AND PRODUCT CHARACTERISTICS AT TIME OF DISPOSAL.

## WASTE MANAGEMENT:

DISPOSE OF WASTE BY SUPERVISED INCINERATION IN COMPLIANCE WITH APPLICABLE LAWS AND REGULATIONS. DISPOSE OF WASTE AT AN APPROPRIATE WASTE DISPOSAL FACILITY IN ACCORDANCE WITH CURRENT APPLICABLE LAWS AND REGULATIONS, AND PRODUCT CHARACTERISTICS AT TIME OF DISPOSAL.

## \*\*\*\*\* SPECIAL PROTECTION INFORMATION \*\*\*\*\*

## EYE PROTECTION:

NO SPECIAL EQUIPMENT REQUIRED.

## SKIN PROTECTION:

IMPERVIOUS GLOVES AND PROTECTIVE CLOTHING SHOULD BE WORN.

## RESPIRATORY PROTECTION:

NO SPECIAL REQUIREMENTS UNDER ORDINARY CONDITIONS OF USE AND WITH ADEQUATE VENTILATION. APPROVED RESPIRATORY EQUIPMENT MUST BE USED FOR HIGH VAPOR OR MIST CONCENTRATIONS.

## VENTILATION:

VENTILATION DESIRABLE AND EQUIPMENT SHOULD BE EXPLOSION PROOF. USE IN WELL VENTILATED AREA.

OTHER: PRIMARY ROUTE OF ENTRY - SKIN CONTACT/INHALATION

## \*\*\*\*\* SPECIAL PRECAUTIONS \*\*\*\*\*

## HANDLING:

AVOID CONTACT WITH SKIN.

## STORAGE:

STORE IN A COOL, DRY AREA AWAY FROM IGNITION SOURCES.

STORED MATERIALS MUST BE LABELED AS: 2-ETHYLHEXYL CHLORIDE.

THIS PRODUCT IS CLASSIFIED AS A COMBUSTIBLE LIQUID, N.O.S., UN 1993 BY DOT.

\*\*\*\*\* HEALTH HAZARD DATA \*\*\*\*\*

## ACUTE HEALTH HAZARDS

NONE KNOWN

## CARCINOGENICITY

LISTED: NTP NO IARC MONOGRAPHS NO OSHA REGULATED NO

## SIGNS AND SYMPTOMS OF EXPOSURE:

MODERATE SKIN IRRITATION. RESPIRATORY IRRITATION, DIZZINESS, NAUSEA,  
LOSS OF CONSCIOUSNESS.

## MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE:

NONE KNOWN

## SUBACUTE AND MUTAGENICITY (SUMMARY)

AMES TEST: NEGATIVE

## CHRONIC OR SPECIALIZED (SUMMARY)

NE

## TARGET ORGAN EFFECTS

SKIN, EYE - MODERATE IRRITANT

## OTHER DATA

NONE

\*\*\*\*\* WARNING STATEMENTS

\*\*\*\*\*

N/A

ALBRIGHT & WILSON AMERICAS INC.  
ENVIRONMENTAL SERVICES

P. O. BOX 26229  
RICHMOND, VA. 23260-6229 (USA)

\*\*\*\*\* PRODUCT IDENTIFICATION \*\*\*\*\*  
HYDROCHLORIC ACID 32 PCT.

SUPPLIER: ALBRIGHT & WILSON INC.	HEALTH EMERGENCY TELEPHONE: (803)554-1229
CHEMICAL NAMES AND SYNONYMS: MURIATIC ACID, HYDROGEN CHLORIDE	TRANSPORT EMERGENCY TELEPHONE: (800)424-9300 (CHEMTREC)
USE OR DESCRIPTION: INDUSTRIAL CHEMICAL	OTHER DESIGNATION: 839

\*\*\*\*\* TYPICAL CHEMICAL AND PHYSICAL PROPERTIES \*\*\*\*\*

APPEARANCE: CLEAR TO SLIGHTLY YELLOW LIQUID	VISCOSITY: AT 100 F, SUS NE	AT 40 C, CS NE
ODOR: SHARP, PENETRATING, IRRITATING	VISCOSITY: AT 210 F, SUS NE	AT 100 C, CS NE
RELATIVE DENSITY: 20C 1.15	SOLUBILITY IN WATER: MISCIBLE	PH: < 1.0
MELTING POINT: F(C) -50 (-45)	POUR POINT: F(C) NA	
BOILING POINT: F(C) 230(110)	FLASH POINT: F(C) (METHOD) NONE	
VAPOR PRESSURE:MM HG @ 70F 25.8		

NA=NOT APPLICABLE    NE=NOT ESTABLISHED    D=DECOMPOSES

\*\*\*\*\* INGREDIENTS \*\*\*\*\*

	WT PCT (APPROX)	PEL MG/M3	PPM	TLV(TWA) MG/M3	PPM
HAZARDOUS INGREDIENTS:					
HYDROCHLORIC ACID (7647-01-0)	32	C7	C5	C7	C5

NOTE: TLVS SHOWN FOR GUIDANCE ONLY. FOLLOW APPLICABLE REGULATIONS.  
( C-DENOTES A CEILING LIMIT.)

INFORMATION GIVEN HEREIN IS OFFERED IN GOOD FAITH AS ACCURATE, BUT WITHOUT GUARANTEE. CONDITIONS OF USE AND SUITABILITY OF THE PRODUCT FOR PARTICULAR USES ARE BEYOND OUR CONTROL; ALL RISKS OF USE OF THE PRODUCT ARE THEREFORE ASSUMED BY THE USER AND WE EXPRESSLY DISCLAIM ALL WARRANTIES OF EVERY KIND AND NATURE, INCLUDING WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE IN RESPECT TO THE USE OR SUITABILITY OF THE PRODUCT. NOTHING IS INTENDED AS A RECOMMENDATION FOR USES WHICH INFRINGE VALID PATENTS OR AS EXTENDING LICENSE UNDER VALID PATENTS. APPROPRIATE WARNINGS AND SAFE HANDLING PROCEDURES SHOULD BE PROVIDED TO HANDLERS AND USERS.

WILL NOT OCCUR NE

\*\*\*\*\* SPILL OR LEAK PROCEDURE \*\*\*\*\*  
ENVIRONMENTAL IMPACT:

REPORT SPILLS AS REQUIRED TO APPROPRIATE AUTHORITIES. U. S. COAST GUARD REGULATIONS REQUIRE IMMEDIATE REPORTING OF SPILLS THAT COULD REACH ANY WATERWAY INCLUDING INTERMITTENT DRY CREEKS. REPORT SPILL TO COAST GUARD TOLL FREE NUMBER 800-424-8802. IN CASE OF ACCIDENT OR ROAD SPILL NOTIFY CHEMTREC (800) 424-9300.

PROCEDURES IF MATERIAL IS RELEASED OR SPILLED:

PERSONNEL PERFORMING CLEANUP MUST USE PROTECTIVE EQUIPMENT. SPRINKLE HYDRATED LIME OR SODA ASH ON SPILL AREA. FLUSH WITH WATER INTO SEWER CONNECTED TO WASTEWATER TREATMENT SYSTEM IN COMPLIANCE WITH APPLICABLE LAWS AND REGULATIONS.

WASTE MANAGEMENT:

SLOWLY ADD WASTE TO A LARGE VOLUME OF AGITATED SOLUTION OF SODA ASH AND SLAKED LIME. FLUSH NEUTRALIZED SOLUTION INTO SEWER CONNECTED TO WASTEWATER TREATMENT SYSTEM IN COMPLIANCE WITH APPLICABLE LAWS AND REGULATIONS. RINSE DRUMS WITH A CAUSTIC SODA SOLUTION, FOLLOWED BY WATER, PRIOR TO DISPOSAL OR REUSE.

\*\*\*\*\* SPECIAL PROTECTION INFORMATION \*\*\*\*\*  
EYE PROTECTION:

SNUG FITTING, LIQUID PROOF GOGGLES WITH FACE SHIELD MUST BE WORN. EYE WASH FOUNTAINS SHOULD BE READILY AVAILABLE.

SKIN PROTECTION:

PROTECTIVE CLOTHING SUCH AS UNIFORMS, COVERALLS OR LAB COATS SHOULD BE WORN. IMPERVIOUS GLOVES AND APRONS MUST BE WORN. WHEN HANDLING LARGE QUANTITIES, IMPERVIOUS SUITS AND BOOTS MUST BE WORN.

RESPIRATORY PROTECTION:

USE ONLY WITH ADEQUATE VENTILATION. WHEN ADEQUATE VENTILATION IS NOT AVAILABLE, A NIOSH-APPROVED MIST FILTER, ACID GAS CARTRIDGE MUST BE USED. WHEN CONDITIONS WARRANT HIGHER PROTECTION LEVELS, A POSITIVE PRESSURE, AIR SUPPLIED RESPIRATOR MUST BE USED.

VENTILATION:

ADEQUATE VENTILATION MUST BE SUPPLIED AS INDICATED BY USE CONDITIONS TO MINIMIZE PERSONAL EXPOSURE.

OTHER: PRIMARY ROUTE OF ENTRY-SKIN CONTACT/INHALATION

\*\*\*\*\* SPECIAL PRECAUTIONS \*\*\*\*\*  
HANDLING: AVOID INHALATION OF VAPORS OR MISTS. AVOID INGESTION. AVOID ALL PERSONAL CONTACT.

STORAGE: STORE IN A DRY WELL VENTILATED LOCATION, AWAY FROM FIRE HAZARDS AND PROXIMITY TO ACTIVE METALS. EXERCISE DUE CAUTION TO PREVENT DAMAGE TO AND LEAKAGE FROM PRODUCT CONTAINERS.

STORED MATERIALS MUST BE LABELED AS: HYDROCHLORIC ACID 32%.

THIS PRODUCT IS CLASSIFIED AS HYDROCHLORIC ACID SOLUTION, A CORROSIVE LIQUID, UN 1789 BY DOT.

\*\*\*\*\* HEALTH HAZARD DATA \*\*\*\*\*

#### ACUTE HEALTH HAZARDS

CORROSIVE TO ALL TISSUES. HIGHLY TOXIC BY ALL ROUTES.

#### CARCINOGENICITY

LISTED: NTP NO IARC MONOGRAPHS NO OSHA REGULATED NO

#### SIGNS AND SYMPTOMS OF EXPOSURE:

INGESTION: CORROSIVE TO ESOPHAGUS, STOMACH; BURNING PAIN, NAUSEA, DIARRHEA. INHALATION: PULMONARY EDEMA, LARYNGEAL SPASM, COUGHING, CHOKING. SKIN: BURNING, DERMITITIS, PHOTSENSITIZATION. OTHER: DENTAL NECROSIS, BLEEDING OF GUMS AND NOSE.

#### MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE:

RESPIRATORY DISEASES MAY BE AGGRAVATED.

#### SUBACUTE AND MUTAGENICITY (SUMMARY)

##### MUTAGENIC

#### CHRONIC OR SPECIALIZED (SUMMARY)

##### REPRODUCTIVE EFFECTS WITH PROLONGED EXPOSURE.

##### TARGET ORGAN EFFECTS

CORROSIVE TO TISSUES WITH WHICH IT MAKES CONTACT: EYE, SKIN, MUCOUS MEMBRANES, LUNG.

#### OTHER DATA

##### TOXIC TO FISH AND WILDLIFE



\*\*\*\*\* WARNING STATEMENTS

\*\*\*\*\*

## SECTION 313 SUPPLIER NOTIFICATION:

THIS PRODUCT CONTAINS THE FOLLOWING TOXIC CHEMICALS SUBJECT  
TO THE REPORTING REQUIREMENTS OF SECTION 313 OF THE EMERGENCY  
PLANNING AND COMMUNITY RIGHT-TO-KNOW ACT OF 1986 AND OF 40 CFR 372.

<u>CAS #</u>	<u>CHEMICAL NAME</u>	<u>PERCENT BY WEIGHT</u>
7647-01-0	HYDROCHLORIC ACID	32

## **EXHIBIT H**

### **MATERIAL SAFETY DATA BULLETIN FOR DEHPA**

ALBRIGHT & WILSON AMERICAS INC.  
ENVIRONMENTAL SERVICES

P. O. BOX 26229  
RICHMOND, VA. 23260-6229 (USA)

\*\*\*\*\* PRODUCT IDENTIFICATION \*\*\*\*\*  
DI-2-ETHYLHEXYL PHOSPHORIC ACID

SUPPLIER:	HEALTH EMERGENCY TELEPHONE:
ALBRIGHT & WILSON INC.	(803)554-1229
CHEMICAL NAMES AND SYNONYMS:	TRANSPORT EMERGENCY TELEPHONE:
DEHPA	(800)424-9300(CHEMTREC)
USE OR DESCRIPTION:	OTHER DESIGNATION:
ORE EXTRACTION AGENT	969

\*\*\*\*\* TYPICAL CHEMICAL AND PHYSICAL PROPERTIES \*\*\*\*\*

APPEARANCE:	VISCOSITY: AT 100 F, SUS	AT 40 C, CS
YELLOW LIQUID	100.0	20.5
ODOR:	VISCOSITY: AT 210 F, SUS	AT 100 C, CS
MILD	NE	NE
RELATIVE DENSITY: 15/4 C	SOLUBILITY IN WATER:	PH:
0.972	NEGLIGIBLE	NA
MELTING POINT: F(C)	POUR POINT: F(C)	
-76(-60)	-76(-60)	
BOILING POINT: F(C)	FLASH POINT: F(C) (METHOD)	
NE	303 F (SETAFLASH CC)	
VAPOR PRESSURE:MM HG 20C		
NE		

NA=NOT APPLICABLE    NE=NOT ESTABLISHED    D=DECOMPOSES

\*\*\*\*\* INGREDIENTS \*\*\*\*\*

	WT PCT (APPROX)	PEL MG/M3	PPM	TLV(TWA) MG/M3	PPM
HAZARDOUS INGREDIENTS:					
DI-2-ETHYLHEXYL PHOSPHORIC ACID (298-07-7)	96	NE	NE	NE	NE
MONO-2-ETHYLHEXYL PHOSPHORIC ACID (1070-03-7)	2	NE	NE	NE	NE
TRIS-2-ETHYLHEXYL PHOSPHATE (78-42-2)	2	NE	NE	NE	NE

NOTE: TLVS SHOWN FOR GUIDANCE ONLY. FOLLOW APPLICABLE REGULATIONS.

INFORMATION GIVEN HEREIN IS OFFERED IN GOOD FAITH AS ACCURATE, BUT WITHOUT GUARANTEE. CONDITIONS OF USE AND SUITABILITY OF THE PRODUCT FOR PARTICULAR USES ARE BEYOND OUR CONTROL; ALL RISKS OF USE OF THE PRODUCT ARE THEREFORE ASSUMED BY THE USER AND WE EXPRESSLY DISCLAIM ALL WARRANTIES OF EVERY KIND AND NATURE, INCLUDING WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE IN RESPECT TO THE USE OR SUITABILITY OF THE PRODUCT. NOTHING IS INTENDED AS A RECOMMENDATION FOR USES WHICH INFRINGE VALID PATENTS OR AS EXTENDING LICENSE UNDER VALID PATENTS. APPROPRIATE WARNINGS AND SAFE HANDLING PROCEDURES SHOULD BE PROVIDED TO HANDLERS AND USERS.

NONE KNOWN

## NE

\*\*\*\*\* SPILL OR LEAK PROCEDURE \*\*\*\*\*  
ENVIRONMENTAL IMPACT:

REPORT SPILLS AS REQUIRED TO APPROPRIATE AUTHORITIES. U. S. COAST GUARD REGULATIONS REQUIRE IMMEDIATE REPORTING OF SPILLS THAT COULD REACH ANY WATERWAY INCLUDING INTERMITTENT DRY CREEKS. REPORT SPILL TO COAST GUARD TOLL FREE NUMBER 800-424-8802. IN CASE OF ACCIDENT OR ROAD SPILL NOTIFY CHEMTREC (800) 424-9300.

PROCEDURES IF MATERIAL IS RELEASED OR SPILLED:

PERSONNEL PERFORMING CLEANUP MUST USE PROTECTIVE EQUIPMENT. ADSORB ON FIRE RETARDANT TREATED SAWDUST, DIATOMACEOUS EARTH, ETC. SHOVEL UP AND DISPOSE OF AT AN APPROPRIATE WASTE DISPOSAL FACILITY IN ACCORDANCE WITH CURRENT APPLICABLE LAWS AND REGULATIONS, AND PRODUCT CHARACTERISTICS AT TIME OF DISPOSAL.

WASTE MANAGEMENT:

DISSOLVE WASTE IN A SOLVENT AND DISPOSE BY SUPERVISED INCINERATION IN COMPLIANCE WITH APPLICABLE LAWS AND REGULATIONS.

\*\*\*\*\* SPECIAL PROTECTION INFORMATION \*\*\*\*\*

EYE PROTECTION:

CHEMICAL TYPE GOGGLES WITH FACE SHIELD MUST BE WORN.

SKIN PROTECTION:

PROTECTIVE CLOTHING SUCH AS UNIFORMS, COVERALLS OR LAB COATS SHOULD BE WORN. IMPERVIOUS GLOVES AND APRONS MUST BE WORN. WHEN HANDLING LARGE QUANTITIES, IMPERVIOUS SUITS AND BOOTS MUST BE WORN.

RESPIRATORY PROTECTION:

NO SPECIAL REQUIREMENTS UNDER ORDINARY CONDITIONS OF USE AND WITH ADEQUATE VENTILATION. APPROVED RESPIRATORY PROTECTIVE EQUIPMENT MUST BE USED IN HIGH VAPOR OR MIST CONCENTRATIONS.

VENTILATION:

NO SPECIAL REQUIREMENTS UNDER ORDINARY CONDITIONS OF USE AND WITH ADEQUATE VENTILATION.

OTHER: PRIMARY ROUTE OF ENTRY- SKIN CONTACT

\*\*\*\*\* SPECIAL PRECAUTIONS \*\*\*\*\*

HANDLING: AVOID INHALATION OF VAPORS OR MISTS. AVOID ALL PERSONAL CONTACT.

STORAGE: SEE APPENDIX FOR PRECAUTIONARY LABEL. ICG-969

STORED MATERIALS MUST BE LABELED AS: DI-2-ETHYLHEXYL PHOSPHORIC ACID.

THIS PRODUCT IS CLASSIFIED AS CORROSIVE, NA 1902 BY DOT.

\*\*\*\*\* HEALTH HAZARD DATA \*\*\*\*\*

## ACUTE HEALTH HAZARDS

EYE, SKIN, MUCOUS MEMBRANE IRRITANT

## CARCINOGENICITY

LISTED: NTP NO IARC MONOGRAPHS NO OSHA REGULATED NO  
TRIS 2-ETHYLHEXYL PHOSPHATE IS CARCINOGENIC BY RETCS CRITERIA.

## SIGNS AND SYMPTOMS OF EXPOSURE:

IRRITATION OF EYES, SKIN, OR MUCOUS MEMBRANES

## MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE:

NONE KNOWN

## SUBACUTE AND MUTAGENICITY (SUMMARY)

MOUSE LYMPHOMA TEST: NEGATIVE

AMES TEST: NEGATIVE

## CHRONIC OR SPECIALIZED (SUMMARY)

NONE KNOWN

## TARGET ORGAN EFFECTS

SKIN, EYE, MUCOUS MEMBRANE (IRRITATION)

## OTHER DATA

NONE KNOWN

\*\*\*\*\* WARNING STATEMENTS \*\*\*\*\*

CALIFORNIA:

"WARNING: THIS PRODUCT MAY CONTAIN A CHEMICAL KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER, OR BIRTH DEFECTS OR OTHER REPRODUCTIVE HARM".

ALL PHOSPHORUS COMPOUNDS MAY BE REASONABLY EXPECTED TO CONTAIN ARSENIC AND POSSIBLY CADMIUM AND/OR LEAD IN CONCENTRATIONS RANGING FROM A FEW PARTS PER BILLION TO A FEW PARTS PER MILLION.

**EXHIBIT I**

**DETAILS OF CAPITAL MODIFICATIONS TO NO. 10 UNIT FOR DEHPA MANUFACTURE  
(CEDAR CHEMICAL - W. HELENA, ARKANSAS)**



DETAILS OF CAPITAL MODIFICATIONS TO NO. 10 UNIT FOR DEHPA MANUFACTURE  
(CEDAR CHEMICAL - W. HELENA, ARKANSAS)

1. **PCl<sub>3</sub> Railcar**
  - 1.1 Install new nitrogen piping to railcar with new pressure regulator.
  - 1.2 Install new 2" FRP vent line to scrubber with flow orifice.
  - 1.3 Install new 2" TFE lined PCl<sub>3</sub> transfer line from railcar to R-N105 (PCl<sub>3</sub> hold tank) with tank truck loading connection.
2. **17% Caustic Tank**
  - 2.1 Install 2" carbon steel piping to R-N102 (Neutralization Vessel).
3. **EHA Railcar**
  - 3.1 Install new nitrogen piping to railcar with new pressure regulator.
  - 3.2 Install new 2" stainless steel transfer line from railcar to R-N101 (reactor).
4. **Cl<sub>2</sub> Railcar**
  - 4.1 Install check valves and new hose on nitrogen to Cl<sub>2</sub> railcar.
  - 4.2 Install new 2" FRP vent line to scrubber.
  - 4.3 Install 2" air actuated shutoff valve at railcar station.
  - 4.4 Disassemble, inspect, and clean vaporizer.
  - 4.5 Replace Cl<sub>2</sub> control valve and relocate chlorine flow instrumentation for greater accuracy and control at lower flow rates.
5. **PCl<sub>3</sub> Measuring Tank (R-N105)**
  - 5.1 Install relocated high level switch and interlock to shut off PCl<sub>3</sub> on high level.
  - 5.2 Remove existing overhead piping and install 2" FRP vent piping to scrubber.
  - 5.3 Install relocated relief vessel.
  - 5.4 Repipe rupture disc to relief vessel.
  - 5.5 Install 2" TFE lined actuated valve on vessel outlet.
  - 5.6 Install 2" TFE piping from R-N105 to R-N101 (reactor) with new flow transmitter and flow control valve.
6. **Phosphite/Chlorination Reactor (R-N101)**
  - 6.1 Install new check valve on chlorine line to R-N101.
  - 6.2 Reinstall 4" TFE lined circulation piping with new thermocouple.
  - 6.3 Install 4" carbon steel brine piping to circulation exchanger with new control valve.
  - 6.4 Install check valve on chlorine to R-N101.
  - 6.5 Fabricate and install new sample hood with vent line to scrubber.
  - 6.6 Install rotameter on nitrogen line to chlorine dip pipe.
  - 6.7 Reconfigure alarm and interlock system as required.
  - 6.8 Install piping to R-N104.
  - 6.9 Purchase and install new heels pump and piping to R-N104.
  - 6.10 Replace 4" stainless steel rupture disc with graphite.
  - 6.11 Install 4" FRP vent line to HCl Absorber (C-N402).

7. Hydrolysis and Stripping (R-N104)
  - 7.1 Install new 6" GLS vapor line to overhead condenser.
  - 7.2 Install new 3" TFE lined pipe from overhead condenser to receiver.
  - 7.3 Install new steam/water mixing tee, water piping, and steam piping to top of R-N104.
  - 7.4 Install 2" TFE lined piping (acidic wash) to R-N102 and T-N206.
  - 7.5 Install 2" TFE lined piping (product) to R-N103.
8. Stripper Receiver (V-N104)
  - 8.1 Install new 4" FRP vacuum line.
  - 8.2 Install new 2" TFE lined piping to T-N206.
  - 8.3 Install new 2" stainless piping to T-N207.
9. Product Surge Vessel (R-N103)
  - 9.1 Install 2" stainless piping to railcar and tank trucks.
  - 9.2 Install 2" FRP piping to vent system.
10. Waste Surge Vessel (T-N206)
  - 10.1 Install 1" carbon steel nitrogen piping.
  - 10.2 Repipe 2" FRP vent line to vent header.
  - 10.3 Install 2" graphite rupture disc.
  - 10.4 Remove stainless steel piping and pump from discharge of tank. Install 2" TFE lined steel piping to R-N102 (pH adjustment vessel).
11. pH Adjustment Vessel (R-N102)
  - 11.1 Install 2" carbon steel piping to T-B102 (waste storage tank).
12. Spent Scrubber Storage Tank (T-M105)
  - 12.1 Install 2" carbon steel piping to R-N102 (pH adjustment vessel).
13. HCl Absorber (C-N402)
  - 13.1 Fabricate and install new absorber using new 4" GLS pipe, TFE lined instrument tee, and TFE spray nozzle.
  - 13.2 Install 1" carbon steel water line to HCl absorber with check valve, rotameter, and flow limiting orifice.
  - 13.3 Install knockout pot (existing 24" GLS column section).
  - 13.4 Install 2" TFE lined piping to T-N201 (scrubber tank).
  - 13.5 Install 3" FRP piping to C-N401 (scrubber column).
14. Scrubber Tank (T-N201)
  - 14.1 Install existing 2" rotameter in circulation line to C-N401.
  - 14.2 Purchase new drum agitator for thiosulfate.
  - 14.3 Install 2" carbon steel piping to T-M105 (Spent Scrubber Hold Tank).
15. EHCl Recycle Tank (T-N207)
  - 15.1 Install 2" stainless piping to tank truck loading.

*D. Hoppel*

**ALBRIGHT & WILSON**  
Americas

P.O. Box 26229, Richmond, Virginia 23260-6229  
Telephone (804) 550-4300  
FAX (804) 550-4385

RECEIVED  
MAY 11 1992  
Ans'd.....

May 8, 1992

Geoffrey L. Pratt  
Director of Custom Manufacturing  
Cedar Chemical Corporation  
5100 Poplar Avenue, 24th Floor  
Memphis, TN 38137

Dear Geoff:

I enclose a completely signed original of our Phase II Tolling Agreement. If you need any additional information, please do not hesitate to call.

Thank you for your assistance in resolving this matter.

Sincerely,

*Deborah K. Newell*

Deborah K. Newell  
Legal Counsel

DKN/crd

Enclosure

cc: Peter Hastings w/enclosure  
Jim Crawford w/enclosure



ALBRIGHT & WILSON AMERICAS INC.  
A Tenneco Company

## RESTATED TOLLING AGREEMENT

THIS AGREEMENT is made and effective as of January 20, 1992, by and between ALBRIGHT & WILSON AMERICAS INC., a Delaware corporation, with its principal office at 100 Lakeridge Parkway, Ashland, Virginia 23005 ("A&W") and CEDAR CHEMICAL CORPORATION, a Delaware corporation with its principal office at 24th Floor, Clark Tower, 5100 Poplar Avenue, Memphis, Tennessee 38137 (hereinafter "Cedar").

### WITNESSETH:

WHEREAS, A&W has developed and currently possesses a process which it represents to be capable of producing Di 2-ethylhexyl phosphoric acid referred to as DEHPA (the "Product") and is desirous of having the Product manufactured for it according to such process;

WHEREAS, the parties entered into a Tolling Agreement dated as of June 25, 1991 (the "Original Agreement") under which Cedar produced the Product for A&W under the terms of Phase I (as therein defined);

WHEREAS, the parties entered into a Secrecy Agreement dated June 21, 1991 (the "Secrecy Agreement") which governs the terms under which A&W shall disclose confidential and proprietary information and to the extent consistent with and supplementary to this agreement, the Secrecy Agreement is incorporated herein by this reference;

WHEREAS, Cedar has personnel and some of the equipment necessary for the manufacture of the Product and is desirous of manufacturing the Product for A&W in accordance with said process developed by A&W;

WHEREAS, the parties now desire to enter into a second production phase called Phase II subject to the terms and conditions set forth herein; and

WHEREAS, the Original Agreement is superceded by this Agreement from and after the effective date hereof.

NOW THEREFORE, it is agreed as follows:

### 1. DEFINITIONS

For purposes of this Agreement, the following terms shall have the meaning assigned thereto:

1.1 "Phosphorus trichloride" shall mean Raw Material meeting the specifications set forth in Exhibit A attached.

1.2 "2-ethylhexyl alcohol" shall mean Raw Material meeting the specifications set forth in Exhibit A attached.

1.3 "Raw Materials" shall mean phosphorus trichloride, 2-ethylhexyl alcohol, and those other raw materials required for the production of Product as identified in Exhibit A attached.

1.4 "Equipment" shall mean the equipment, improvements and alterations made to Cedar's number 10 production unit at the Plant (hereinafter defined) identified in Exhibit "I," installed for the purpose of enabling Cedar to produce Product hereunder during Phase I.

1.5 "Plant" shall mean Cedar's chemical manufacturing facility at Highway 242, West Helena, Arkansas.

1.6 "Product" shall mean Di 2-ethylhexyl phosphoric acid (DEHPA), the specifications for which are set forth in Exhibit B attached.

1.7 "Intermediates" and "By-Products" shall mean either Di (2-ethylhexyl) phosphorochloride, Bis (2-ethylhexyl) hydrogen phosphite, 2-ethylhexyl chloride or hydrochloric acid or all of these, as the Agreement and the context requires.

1.8 "Phase II Equipment" shall mean all equipment, improvements or alterations necessary to produce the Product during Phase II.

1.10 "Campaign" shall mean the continuous production of Product up to the quantity stated herein.

## 2. TERM

The initial term of this Agreement shall commence and be effective as of January 20, 1992 and shall terminate on the earlier of December 31, 1992 or the date on which production of Product in Phase II is completed. If A&W wishes to extend the term of this Agreement, it shall notify Cedar not later than September 30, 1992 at which time the parties will negotiate in good faith to attempt to reach agreement on fees and other terms applicable to the extended term.

## 3. METHOD OF OPERATION

3.1 A&W shall furnish Cedar with, or cause it to be furnished with Raw Materials in amounts sufficient to enable Cedar to produce in a continuous campaign 5,000,000 pounds of Product in accordance with the conditions of this Agreement; provided that Cedar shall supply all nitrogen required at its cost and all chlorine required at a price of \$35.00 per ton. Cedar will manufacture the Product in one Campaign during the term hereof. Cedar agrees to manufacture 5,000,000 pounds in Phase II at a production rate of between 350,000 and 650,000

pounds of Product per month. The parties acknowledge that the Phase II Equipment has been installed, is operational and that all sums of money due for the Phase II Equipment have been paid.

3.2 Cedar shall provide rail sidings sufficient for a reasonable number of tank cars to be arranged by A&W pursuant to the provisions of Exhibit D for temporary storage and delivery of Products, and receiving, storage, production and delivery facilities and services necessary to fully perform its obligations hereunder which shall include, without limitation, production facilities containing the Phase II Equipment and sufficient technical and administrative personnel and laboratory facilities to enable it to perform hereunder. Cedar shall preserve and protect the Raw Materials and the Product from contamination, loss, theft, damage or destruction, and from attachment, levy, distraint or any other actions by Cedar's creditors, while in Cedar's possession. Cedar shall fully account periodically for all Raw Materials, work in process and the Product in its possession; shall keep such records relating thereto as A&W may reasonably request; and shall furnish A&W with a certificate of insurance that conforms with Cedar's undertakings described in Section 4 below. At the end of each Production Campaign, unused Raw Materials supplied by A&W shall be returned to and accepted by A&W at A&W's cost.

3.3 Raw Materials shall be accepted according to Cedar's ordinary business practices. Cedar shall analyze all Raw Materials delivered to it hereunder in accordance with the test methods designated in Exhibit C, and Cedar shall promptly advise A&W's designated representative of any defects in any such Raw Materials or failure of any of the Raw Materials to conform with said specifications. A weight ticket and certificate of analysis shall be provided by A&W, or its supplier, and by Cedar, or its supplier, for every shipment of Raw Materials. On any Raw Materials imported, Cedar agrees to provide a copy of the bill of lading, a notation as to the port of entry and a certification made to customs that the import does not violate the provisions of the Toxic Substances Control Act. A&W covenants with Cedar that no Raw Materials imported hereunder shall violate the provisions of the Toxic Substances Control Act and agrees to indemnify Cedar and save it harmless with respect thereto.

3.4 Cedar shall ship the Product in accordance with A&W's instructions and at A&W's cost. In connection with each such shipment, Cedar shall prepare a bill of lading in standard form and, immediately after a shipment is made, Cedar will send, by telecopy, a copy of such bill of lading to A&W.

3.5 Each party shall be liable for demurrage to the extent charges therefor result its errors or omissions.

#### 4. TITLE AND RISK OF LOSS

4.1 Title to the A&W Raw Materials delivered by A&W, or its supplier, to Cedar, shall at all times remain solely in A&W; the Raw Materials and the Product shall be segregated from other materials and goods of Cedar and Cedar shall take such steps, including the filing of financing statements centrally and locally indicating A&W's interest in the Raw Materials, the Product in process, the Product, and the proceeds of the foregoing and/or the posting of signs indicating A&W's interest in the foregoing.

4.2 The risk of loss of Raw Materials delivered by A&W or its suppliers shall remain with A&W until delivery of such Raw Materials to the Plant and Cedar's acceptance thereof. Cedar shall not be deemed to have accepted Raw Materials for which it provides notification to A&W in accordance with Section 3, that such Raw Materials fail to meet the specifications set in Exhibit A hereto. Cedar shall also bear the risk of loss on all Product in process and the finished Product while in its possession and control unless and to the extent loss or liability results from A&W's sole negligence. Cedar shall not be liable for economic incidental or consequential damages, such as business interruption or lost profit damages, incurred by A&W due to a loss of Raw Materials, Product in process or Product. In the event of loss or liability arising under this section, Cedar agrees to pay A&W for such loss or liability within 30 days of A&W's invoice therefore, or issue a commensurate credit against fee owed by A&W to Cedar under this tolling agreement as long as such credit does not result in a credit balance being carried by A&W. Cedar shall maintain insurance in appropriate form and amount in accordance with industry standards covering the Raw Materials, the Product in process and the Product. Cedar shall provide A&W with a certificate evidencing its insurance coverage naming A&W as additional insured on liability coverage and as loss payee on property damage to the extent of A&W's interest in such property, and providing that A&W will be notified thirty (30) days prior to cancellation of or an adverse change in Cedar's insurance coverage.

4.3 The risk of loss of the Product produced hereunder shall be A&W's on and after each shipment leaves the Plant.

#### 5. PRODUCT QUALITY

5.1 Cedar shall make its best efforts to produce Product to meet the specifications set forth in Exhibit B. Cedar shall warrant the Product produced hereunder meets such agreed specifications. CEDAR MAKES NO OTHER WARRANTY WITH RESPECT TO THE PRODUCT, INCLUDING WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE AND NONE SHALL BE IMPLIED. To determine

whether Product produced hereunder meets the specifications attached hereto at Exhibit B or any agreed revised specifications:

(i) Cedar shall draw two (2) samples from each batch in accordance with procedures specified by A&W and agreed to by Cedar. Each of said samples shall be marked with Cedar's name and batch number.

(ii) Cedar shall test one (1) of the batch samples in accordance with analytical methods and procedures designated in Exhibit C attached. If the batch conforms to specifications set forth in Exhibit B, it will be approved for shipments pursuant to this Agreement.

(iii) Cedar will seal the tested sample and hold same for two (2) years, at which time the samples may be disposed of, unless A&W instructs Cedar that it intends to pick up the samples or unless otherwise required by law. In any event, samples may be delivered by Cedar to A&W at A&W's cost upon termination of this Agreement. The untested duplicate sample shall be expeditiously sent (at A&W's expense) to A&W at 2151 King Street Extension, Charleston, SC 29405, Attn: William Stewart, or as otherwise specified in writing. Except as specified herein, Cedar shall prepare and handle such samples at no additional expense to A&W. Such samples shall be analyzed by A&W to insure that the Product produced by Cedar meets the specifications set forth in Exhibit B. A&W shall notify Cedar of the results of such analysis not later than thirty (30) days following its receipt of each shipment of Product hereunder.

(iv) If a batch does not conform to specifications, Cedar shall immediately notify Peter Hastings or his designee, at Albright & Wilson Americas, 100 Lakeridge Parkway, Ashland, Virginia 23005 by telephone (804) 550-4348 and mutually agree to a course of action; provided, however, A&W shall make or shall permit Cedar to make reasonable efforts to mitigate liabilities and reduce costs incurred by Cedar, including but not limited to allowing Cedar, under appropriate circumstances to use off-specification Product to blend or further process with newly produced Product. Cedar shall bear all costs of disposal of a batch which fails to meet specifications agreed to by Cedar unless caused by the negligence or fault of A&W.

(v) A Certificate of Analysis will be sent with each shipment of the Product with a copy to A&W.

5.2 In case of a conflict between the results of the tests to be performed by A&W and Cedar as described in this Section 5, an independent testing laboratory to be agreed upon in good faith



by Cedar and A&W shall make the final determination as to whether or not the Product produced meets the specifications set forth in Exhibit C or any revised specifications.

5.3 In the event that the tests referred to in this Section 5, above demonstrate that a shipment of the Product manufactured hereunder does not conform to the specifications agreed to by the parties hereunder, and such failure to conform is the result of Cedar's failure to correctly follow A&W's process or other failure to perform in accordance with this Agreement, Cedar, at its expense, shall produce a replacement batch that does conform with such specifications. In such case, Cedar shall pay for the Raw Materials to produce the conforming batch and A&W shall pay the normal fees as set forth in Section 6 below for the replacement batch except to the extent it has paid the fees for the non-conforming batch.

## 6. PRODUCTION AND FEES

6.1 Cedar shall produce Product hereunder utilizing the Phase II Equipment as shall have been approved by A&W, in accordance with A&W's Process attached hereto as Exhibit E as same may be modified from time to time by written agreement of both parties hereto.

6.2 A&W agrees to pay a production fee during the first campaign of Phase II (manufacture of the first 2,000,000 pounds of Product) in the amount of \$0.65/lb. of Product. Such toll fee shall be invoiced monthly by Cedar as of the end of each production month for all quantities of Product produced during such month, and shall be payable ten (10) days from the date of invoice.

6.3 A&W agrees to pay a toll fee of \$0.275 per pound for every pound of Product manufactured over 2,000,000 pounds up to 5,000,000 pounds in Phase II during the term hereof.

6.4 All aqueous waste disposal costs are to be included in the toll fees payable under Sections 6.2 and 6.3 other than those disposal costs addressed in Section 8.1 concerning ethylhexyl chloride wastes.

## 7. EQUIPMENT LOAN

A&W agrees to loan certain vacuum pumps, miscellaneous equipment and replacement parts ("A&W Equipment") to Cedar during the term hereof. Cedar agrees to maintain the A&W Equipment in good operating condition in accordance with recommended maintenance schedules and procedures, and to insure the property against damage in accordance with Section 4.2, and to indemnify and hold A&W harmless from and against arising from or connected with the operation, use or maintenance of the A&W Equipment while

such A&W Equipment is in the possession and under the control of Cedar. Upon termination of this Agreement, Cedar shall return the A&W Equipment to A&W in as good condition as delivered hereunder, normal wear and tear excepted. The A&W Equipment shall be used exclusively in the manufacture of the Product.

## 8. WASTE DISPOSAL

8.1 Cedar shall handle, and contract for the facilities to handle, the neutralization, storage, transportation and disposal of all the liquid wastes and by-products generated in the manufacture of the Product. All third parties with which Cedar contracts for handling, neutralizing, storage, transportation and disposal shall be duly licensed under applicable federal, state and local laws to perform such services and shall be insured and bonded. Disposal shall be by means selected by Cedar and approved by A&W. A&W has the right to audit all waste disposal related to the Product and its production hereunder. Cedar shall monitor the volume of all wastes generated and shall keep such records as are reasonably required by A&W and as may be required by local, state and federal authorities. A&W shall pay (i) invoice price for all off-Plant waste disposal and (ii) invoice price for the off-site disposal costs after Phase II production of 5,000,000 pounds under this Agreement of up to 1,000 gallons of organic wastes which are accumulated from the cleaning of on-site sumps and reactors used directly in the production of Product.

8.2 Aqueous wastes shall be disposed of at Cedar's expense. A&W shall reimburse Cedar for pre-approved costs (such approval not to be unreasonably withheld by A&W) for disposing of organic wastes on a net 30 day basis.

8.3 Cedar shall indemnify and hold A&W, its parent, Tenneco Inc., and affiliates and subsidiaries harmless against all loss, cost, damages, fines, penalties, liability and expense (including reasonable attorney's fees) ("liabilities") arising out of Cedar's disposal of liquid waste or by-product at Cedar's facility. When waste or by-product is disposed of by third parties contracted in accordance with Section 8.1, Cedar shall (i) procure for the express benefit of A&W and Cedar an indemnification from such third parties for all liabilities associated with such disposal, and (ii) require evidence of insurance on such third party covering the liabilities and naming Cedar and A&W as additional insureds.

## 9. REPORTS AND AUDITS

9.1 Cedar shall supply A&W with production reports on forms agreed to by the parties, and such reports shall be sent to A&W at reasonable time intervals agreed upon by the parties.

9.2 A&W shall have the right to make, or have its auditors make, a stock audit (either physical or book inventory or both) from time to time and at such reasonable times as it may elect and A&W shall have access to Cedar's books and records for this purpose. A&W shall give reasonable notice of such election and shall carry out such audit so as not to interfere with the continued operation of the business of Cedar. Losses reported by Cedar or computed on the basis of A&W audits shall be the difference between (i) the original inventory or the inventory as of the preceding audit, plus deliveries to Cedar, less deliveries by Cedar on A&W's order; and (ii) the inventory as of the date of the current audit. Any payments for shortages shall be based on A&W's actual costs, and shall be made within thirty (30) days of A&W's notification to Cedar and Cedar's acceptance thereof.

#### 10. ACCESS TO PLANT

Cedar shall keep A&W fully and currently informed with respect to the production of the Product and shall afford access to A&W personnel to observe the production operation. A&W shall hold Cedar harmless from and indemnify it against all claims and liability on account of personal injury suffered by such A&W personnel while in Cedar's facility, except to the extent that such injury results from the negligence or willful misconduct of Cedar or its employees or agents.

#### 11. PROCESS IMPROVEMENTS

Information developed in the course of and related to the production of the Product hereunder shall be promptly disclosed to A&W. As between Cedar and A&W, such information except as it relates to improvements or changes to equipment or its operation, whether patentable or not, shall be the sole and exclusive property of A&W. Cedar acknowledges that it has entered into a Secrecy Agreement with A&W under which it has agreed to maintain information concerning A&W's process and the Products in confidence. Cedar further agrees that it will not use nor allow third parties to use any information which is proprietary and confidential information of A&W in competition with A&W.

#### 12. TAXES

Cedar shall be responsible for, and will pay, all personal property taxes levied on A&W's property while in the custody of Cedar, and Cedar shall pay all taxes and fees in respect to or measured by the manufacture of the Product or the storage or delivery of A&W's property but Cedar shall not be responsible for and A&W shall be responsible for and shall pay all taxes in the nature of sales taxes levied on the Product delivered pursuant to A&W's instructions. Cedar shall provide A&W with receipts for taxes paid by it hereunder for A&W's account.

### 13. RIGHTS UPON TERMINATION

All Raw Materials, product in process and the Product remaining in Cedar's possession on termination of this Agreement shall be shipped to A&W or its designee at A&W's expense. Further, all drawings, reports and other data relating to the subject matter of this Agreement, which have been or are delivered to Cedar by A&W, shall be and remain the property of A&W and shall be returned to A&W upon termination of this Agreement or in accordance with the terms of the Secrecy Agreement. Cedar is expressly prohibited from making copies of any such drawing, reports or other data supplied by A&W and related to the subject matter of this Agreement, other than as necessary to perform this Agreement. Cedar shall not use A&W's proprietary information in competition with A&W for the term hereof and for a period of ten (10) years after termination of this Agreement. This covenant shall survive the termination of this Agreement and the Secrecy Agreement.

### 14. INDEMNIFICATION

Except with respect to indemnification pursuant to Section 8 of this Agreement:

14.1 Cedar acknowledges that it has been made aware of the nature of the Raw Materials and the Product. Cedar acknowledges that it has been supplied with the Material Safety Data Sheets (see Exhibits G and H) for the Raw Materials and by-products and the Material Safety Data Sheets for the Product ("the Sheets"). Cedar agrees to warn all persons who may become exposed to such Raw Materials, by-products and/or the Product, while on Cedar's Plant, of any hazards indicated on said Sheets as being associated with such Raw Materials, by-products and/or the Product, and to comply with said Sheets. Except with respect to A&W's employees or contractors, Cedar shall indemnify and save harmless A&W from and against any and all losses, liability, damage and expense (including reasonable attorneys' fees) of every character whatsoever, for injuries, sickness, disease or death (including death resulting from such injuries, sickness and/or disease) sustained by any person, arising out of or resulting from Cedar's failure to warn any such persons and/or to comply with said Sheets.

14.2 A&W acknowledges that it has been made aware of the nature of the Raw Materials, by-products and the Product. A&W acknowledges that it possesses or has been supplied with the Material Safety Data Sheets ("Sheets") (see Exhibits G and H) for the Raw Materials, by-products and the Product. A&W agrees to warn all persons who may become exposed to such Raw Materials, by-products and/or the Product, while in A&W's custody or control, of any hazards indicated on said Sheets as being

associated with such Raw Materials, by-products and/or the Product, and to comply with said Sheets. Except with respect to Cedar's employees or contractors, A&W shall indemnify and save harmless Cedar from and against any and all losses, liability, damage and expense (including reasonable attorneys' fees) of every character whatsoever, for injuries, sickness, disease or death (including death resulting from such injuries, sickness and/or disease) sustained by any person, arising out of or resulting from A&W's failure to warn any such persons of hazards indicated on the Sheets and/or to comply with said Sheets.

14.3 Cedar agrees to hold A&W harmless from and to indemnify A&W against all loss, cost, damages, liability and expense (including reasonable attorney's fees) on account of death, personal injury or property damage that results from or is related to an occurrence involving Cedar's handling or storage of Raw Materials or Cedar's manufacture, handling, storage, or delivery to the Carrier of the Product during periods when such Raw Materials or the Product are in Cedar's possession or control, unless and to the extent caused by A&W's negligence.

14.4 A&W agrees to hold Cedar harmless from and to indemnify Cedar against all loss, costs, damages, liability and expense (including reasonable attorney's fees) on account of death, personal injury or property damage that results from or is related to occurrences involving the handling, storage, transportation, sale or use of Raw Materials delivered to Cedar hereunder and the Product produced by Cedar hereunder when such Raw Materials and the Product are not in Cedar's possession and control, unless and to the extent caused by Cedar's negligence.

14.5 Neither party shall be liable to the other for any indirect, incidental or consequential damages, regardless of fault or concurrent negligence of the parties.

## 15. COMPLIANCE WITH LAWS

Both parties shall fully comply with every federal, state and local law, ordinance, order, rule and regulation to which it is subject as a result of and to the extent required by their obligations hereunder including, without limitation, the Fair Labor Standards Act, as amended, and Executive Order No. 11246 (Equal Employment Opportunity) with all amendments thereto or as it may be superseded, and both parties agree that all the provisions of said Executive Order, as amended or superseded, are hereby made a part hereof by reference and are binding upon the parties. Both parties confirm that they have complied and they and their subcontractors and vendors will comply with the applicable provisions of said Executive Order and the rules and regulations promulgated under the authority thereof, including, among others, reporting requirements. Each party shall indemnify and save the other harmless from all costs, damages, fines,

penalties, liabilities, losses and expenses the other party shall incur as a consequence of the violation of any law, ordinance, order, rule or regulation by the offending party. A party shall not be deemed in violation of any law, ordinance, order, rule or regulation while any governmental finding of such violation is being contested in good faith by that party.

Cedar specifically agrees that it shall comply with all applicable health, safety and environmental laws, regulations, rules and orders related to the manufacture, handling, storage, transportation and disposal of the Product, the Raw Materials, the Intermediates and any wastes.

#### 16. CONTINGENCIES

No liability shall result from non-performance or delay in performance caused by circumstances, including, without limitation, fire, flood, acts of God, strikes, riots, governmental action or inaction and the like, so long as the circumstance causing such delay or non-performance is beyond the control of the affected party; provided, however, that any party whose performance is prevented or impeded by such circumstances shall promptly provide written notice, with reasonable particulars, to the other party.

#### 17. NOTICES

All notices required herein shall be deemed to be properly served if sent by first class mail with postage fully prepaid thereon, or by facsimile and addressed to the party for whom intended at the following addresses:

If to A&W:	Albright & Wilson Americas Inc. 100 Lakeridge Parkway Ashland, VA 23005 Attn: Peter Hastings Phone: (804) 550-4348 Fax: (804) 550-4385
------------	---

If to Cedar:	Cedar Chemical Corporation 5100 Poplar Avenue Memphis, TN 38137 Attn: Geoffrey L. Pratt Phone: (901) 684-5373 Fax: (901) 684-5398
--------------	--

#### 18. TERMINATION

18.1 Default - Anything elsewhere in this Agreement to the contrary notwithstanding, if a party breaches any of its obligations hereunder, the non-defaulting party may terminate this Agreement effective fifteen (15) days following written

notice to the defaulting party of such default, provided such default shall not have been cured by the effective day of such notice.

18.2 Upon sale of all or substantially all of A&W's assets related to the production of Product, A&W or its successor may terminate this agreement by giving Cedar 60 days written notice. Upon termination, A&W's exclusive liability shall be to pay for goods identified to this Agreement.

#### 19. INDEPENDENT CONTRACTOR

Neither Cedar nor any employees of Cedar are employees of A&W, it being understood that Cedar is an independent contractor and is solely responsible for the employment, control and conduct of Cedar's employees.

#### 20. NO CLAIMS

As of the date of execution of this Agreement, each party represents and warrants that it knows of no claim against the other under any provision of this Agreement.

#### 21. GENERAL

The parties further agree as follows:

21.1 This Agreement shall be governed by the laws of the Commonwealth of Virginia without giving effect to its choice of law rules.

21.2 This Agreement constitutes the entire agreement between the parties with regard to the matters contained herein and there are no understandings or agreements, express or implied, not expressly set forth herein. No modification of this Agreement or waiver of any of its provisions shall be effective unless it is in writing and signed by the party to be bound thereby. Neither party's waiver of any breach of any of the provisions of this agreement shall be deemed to be a waiver of any subsequent breach of the same nature or any breach of a different nature. To the extent that either or both of the parties find it convenient to employ their normal forms of purchase order or acknowledgment of order in administering the terms of this Agreement, it or they may do so, but none of the terms and conditions printed or otherwise appearing on such form shall be applicable except to the extent that they reflect the quality, mode of shipment, or timing of deliveries.

21.3 This Agreement shall bind the successors and assigns of the parties hereto, but neither party may assign its interest in this Agreement without the prior written consent of the other party, which consent shall not be unreasonably withheld,

provided, however, either party may assign its rights in this Agreement to a subsidiary of such party or to a purchaser of all or substantially all of such party's business or assets, or of the business or assets to which this Agreement relates, provided further that if a party seeks to assign its interest in this Agreement and the other party refuses to consent to such assignment, this Agreement will terminate without liability to either party.

21.4 All Exhibits referred to herein are deemed to be incorporated herein and made a part hereof. The section headings in this Agreement are inserted for convenience only and are not to be construed as part of this Agreement nor as a limitation of the scope of the particular sections to which they refer.

IN WITNESS WHEREOF, A&W and Cedar have caused this Agreement to be executed by their duly authorized representatives.

ALBRIGHT & WILSON AMERICAS INC.

CEDAR CHEMICAL CORPORATION

BY Peter C. Hastings

TITLE Manager Toll Mow facturing

DATE May 8, 1992

BY Geoff R. Peto

TITLE Director Custom Mfg

DATE May 1, 1992

3A:\TOLRES.CED



A&W - ADPA

# ALBRIGHT & WILSON Americas

Form 10003 (12/88)

## REQUISITION/PURCHASE ORDER

Shipping: 2151 King Street Extension  
Charleston, South Carolina  
29405-8339

Mailing: 2151 King Street Extension  
Charleston, South Carolina  
29405-8339



Albright & Wilson Americas  
a Tenneco Company

803-740-5200  
FAX 803-740-5230

Attention:

DATE: <b>2/24/95</b>	ACCOUNT <b>750551.7539.71K</b>	TAXABLE	TAX EXEMPT <input checked="" type="checkbox"/>	ORDER NO: <b>C 94384</b>
PROJECT: <b>71K</b>		SC EXEMPT #SC 12811 (19)		

TO: Cedar Chemical  
Highway 242 South  
W. Helena, AK 99700

INVOICES MUST BE RENDERED IN DUPLICATE TO THE ABOVE  
ADDRESS: ATTENTION ACCOUNTING DEPARTMENT

Payment Terms: **D-30**

Delivery Terms: FOB:

Ship Via:

Date Required at Destination: **4-1-95**

Confirming To:

Confirming Date:

PLEASE ENTER OUR PURCHASE ORDER ("ORDER") FOR THE FOLLOWING, SUBJECT TO THE TERMS AND CONDITIONS SET FORTH ON THE FACE AND BACK OF THIS ORDER. IMPORTANT - THIS ORDER EXPRESSLY LIMITS ACCEPTANCE TO TERMS AND CONDITIONS STATED ON THE FACE AND BACK HEREOF, AND ANY ADDITIONAL OR DIFFERENT TERMS AND CONDITIONS PROPOSED BY THE SELLER SHALL BE DEEMED MATERIAL ALTERATIONS HEREOF AND ARE REJECTED IN ACCORDANCE WITH PARAGRAPH 1 ON THE REVERSE SIDE UNLESS EXPRESSLY AGREED TO BY BUYER IN WRITING. IF SELLER COMMENCES SHIPMENT PURSUANT TO THIS ORDER, THEN SELLER SHALL, AS OF THE DATE SELLER HAS COMMENCED SHIPMENT, BE DEEMED TO HAVE AGREED TO AND ACCEPTED THIS ORDER IN ITS ENTIRETY, INCLUDING ITS TERMS AND CONDITIONS.

ITEM NO.	QUANTITY	U/M	CODE NUMBER	DESCRIPTION	U/M PRICE
1	1	ea		Cedar will produce 800,000 pounds of ADPA at a tolling fee of \$0.16 per pound.	
				A & W will supply all raw materials. A & W will arrange transportation of finished product and Acetic Acid.	
				Cedar will dispose of any waste and invoice A & W, at Cedar's invoiced price.	
TOTAL \$					

**IMPORTANT**

SHOW ORDER NUMBERS ON ALL PACKAGES, INVOICES, PACKING LISTS, AND SHIPPERS RECEIPTS.

ATTACH ORIGINAL BILL OF LADING OR EXPRESS RECEIPT AND RECEIPTED BILL FOR PREPAID TRANSPORTATION TO INVOICE.

ALL ITEMS MUST BE IDENTIFIED WITH MANUFACTURER'S NAME ON YOUR INVOICE.

PRICES SHOWN SHALL BE FOR PRODUCT ONLY. APPLICABLE TAXES SHALL BE STATED SEPARATELY.

TRANSPORTATION CHARGES ARE NOT TAXABLE. PLEASE BILL AS A SEPARATE ITEM ON YOUR INVOICE.

PLEASE ADDRESS ALL CORRESPONDENCE TO: ATTENTION OF PURCHASING DEPARTMENT.

By: \_\_\_\_\_  
Purchasing Department

I the undersigned Representative of the Supplier accept this Purchase Order and all conditions thereon and will make delivery on \_\_\_\_\_ 19\_\_\_\_

TITLE

Prepared By:

Authorized Signature

Signature Limitations  
\$

Only Signatures Appearing on Signature Authorization Form within limitations shown will be accepted.

**VENDOR ACKNOWLEDGEMENT**

## PURCHASE TERMS & CONDITIONS

1. This purchase order ("order") is limited to the terms and conditions contained on the face and the back hereof. Any proposal for additional or different terms and conditions or any attempt by Seller to vary the terms and conditions of this order in Seller's acceptance shall be deemed a material alteration of the terms hereof rather than a rejection, and this order shall be deemed accepted without the inclusion of such material alterations. Different terms and conditions proposed by Seller or contained in Seller's documents are hereby objected to and rejected. Delivery by Seller of the products or services covered by this order shall be deemed an acceptance by Seller of this order. In addition, any terms stated in Seller's offer, bid, proposal or confirmation shall not become part of this order and if this order shall be deemed to be an acceptance of an offer made by Seller, such acceptance is expressly conditioned upon Seller's acceptance of the terms hereof.

2. Seller warrants good title to the products, that the transfer of the products is rightful, that the products are free from any valid claim of infringement of any third party intellectual property rights, and that the products are delivered free from any security interest or other lien or encumbrance. Seller agrees to indemnify and hold Buyer harmless from and against any claims or liabilities for infringement of a third party intellectual property right based on Buyer's sale, use, or purchase of products or services sold by the Seller. Seller shall defend any such suits at its own expense, and Buyer shall have the right to have such litigation monitored by its own counsel. In the event any product or service is found to be infringing, Seller shall, at Buyer's option, (i) procure appropriate licenses for Buyer's continued use as intended, (ii) modify the products or services in order to eliminate any infringement, and/or (iii) pay all costs and expenses incurred by Buyer due to the infringement.

3. Seller warrants that the products shall conform to all specifications, descriptions and samples either provided by Buyer to Seller or provided by Seller and adopted by Buyer. Seller warrants the products shall be free from defects in material, workmanship and design, shall be merchantable, and shall be fit for the intended purpose. Any products not as warranted shall, at Buyer's option, be repaired or replaced by Seller at no additional cost to Buyer or, at Buyer's option, Seller shall refund the purchase price and transportation costs applicable thereto. Any products so repaired or replaced shall be covered by the foregoing warranties from the date of such repair or replacement. Buyer reserves the right to inspect any products and reject or revoke acceptance upon any inspection thereof; provided, however, Buyer's failure to inspect or failure to find any defect shall not operate as a waiver of Buyer's rights hereunder. Seller's obligations under this order shall survive inspection, test, acceptance, use or payment by the Buyer.

4. Seller warrants that the products and/or services comply with all applicable federal, state and local statutes, laws, ordinances, codes, executive orders, and other orders, rules and regulations applicable to the products and/or services (including packaging). Seller specifically warrants, to the extent applicable, that the products or services purchased hereunder have been produced or furnished in complete compliance with the Fair Labor Standards Act, Executive Order No. 11246 (Equal Employment Opportunity) and similar laws and orders, as the same may be amended. Seller agrees to execute, upon Buyer's request, Buyer's standard form of Certification of Compliance with such laws and orders which Certification shall become a part hereof upon execution.

5. Seller warrants, to the extent applicable, that all products comply in all respects with (i) the requirements of the Occupational Safety and Health Act and all of the regulations, orders and standards promulgated thereunder, and (ii) Federal Hazardous Substances Act, Federal Poison Prevention Packaging Act and similar regulations governing hazardous materials including regulations issued by the Department of Transportation and recommendations of the United Nations on the transport of dangerous goods. Seller agrees to provide Buyer with Material Safety Data Sheets and all other information reasonably necessary to assist Buyer in the safe handling and use of the products.

6. Neither party shall be liable for failure or delay in performance of this order due in whole or in part to an act of God, labor dispute, civil commotion, sabotage, fire, acts of government or any other similar or dissimilar cause beyond the reasonable control of the affected party which renders such party's performance commercially impracticable under the Uniform Commercial Code. Seller shall notify Buyer immediately of its inability to perform. For the duration of Seller's inability to perform, Buyer may acquire products and services Buyer deems necessary from third parties without incurring liability to Seller and Buyer may deduct the quantity of such products and services from this order. If the period of non-performance extends beyond 30 days, Buyer may, at his option, cancel this order without liability. During any period of reduced output, Seller agrees to fairly allocate available supply to Buyer unless Buyer gives notice to the contrary.

7. Seller shall pay all taxes except such taxes which, by law, must be paid by Buyer. Seller shall notify Buyer of any taxes which Buyer is required to pay by forwarding documentation to Buyer of such statutory obligation.

8. The price for the product shall be as set forth on the front of this order. Should Buyer during the term of this order be able to purchase the same grade of products at a price resulting in a lower delivered cost to Buyer than the delivered cost hereunder and furnish Seller satisfactory proof of same, then Seller shall either meet such lower delivered cost or permit Buyer to purchase elsewhere. Quantity so purchased shall be deducted from the quantity covered by this order. Invoices shall be dated no earlier than the date of shipment and shall be mailed within 24 hours of shipment. Discounts will be calculated from the date of receipt of such invoice. Other payment terms shall be as set forth on the face hereof. Any prepaid transportation charges shall be separately stated on Seller's invoice.

9. Unless otherwise agreed, Seller shall prepay all transportation charges, and risk of loss and title to the product shall pass upon delivery to Buyer or upon delivery at the destination designated by Buyer.

10. Seller assumes all risk of loss of or damage to any property of Buyer entrusted to Seller while in Seller's possession and control. In the event of loss of or damage to such property, Seller shall promptly reimburse Buyer for the value of the Property or promptly repair such property at Seller's sole expense.

11. Seller agrees to hold Buyer, its affiliates, subsidiaries and parent, and their respective officers, directors and employees ("Indemnitees") harmless and indemnify such Indemnitees from and against any claims, losses and liabilities (including attorneys fees) arising from Seller's negligence, gross negligence or willful misconduct, breach of any warranty or other obligation hereunder. Seller shall not be liable for incidental or consequential damages except to the extent related to personal injury or property damage to Buyer or third parties caused by Seller's breach of any warranty, negligence, gross negligence, or willful misconduct.

12. Seller shall not, without Buyer's prior written consent, assign this order or any part of this order. Subject to the foregoing, this order shall be binding upon and inure to the benefit of the successors and permitted assigns of the parties.

13. Buyer has the right to terminate this contract in whole or in part at any time by written notice to Seller. In such event, Seller may claim only properly supported out-of-pocket costs plus a reasonable amount of demonstrable related charges for the work already performed, all to be determined in accordance with generally accepted accounting procedures. For specially prepared products, unique to Buyer's order, any partially completed work or raw materials whose full costs are included in the termination charges shall be identified in writing and held by Seller for disposition in accordance with Buyer's written instructions. Notwithstanding the foregoing, Buyer reserves the right to cancel all or any part of the undelivered portion of this order, without liability.

14. Time is of the essence and Seller's failure to complete delivery within the time specified, or a reasonable time if no time is specified, shall constitute a material breach hereof. Upon such breach, Buyer may, at its option, terminate this order without liability.

15. This order constitutes the entire agreement of the parties and all previous contracts, orders, proposals, bids and communications are hereby superceded (i) unless explicitly incorporated by reference herein, or (ii) unless specifically superceded by term(s) of a contract duly executed by Buyer and Seller applicable to the products described on the face hereof. This order may not be amended or modified without Buyer's written consent. If any provision of this order shall be considered invalid or unlawful, the remaining provisions shall remain in force and effect. Buyer's failure to exercise any right or remedy hereunder shall not constitute a waiver.

16. Seller shall hold any information provided to Seller by Buyer or developed by Seller for Buyer hereunder in confidence and shall not disclose such information without Seller's consent. This obligation shall survive the termination of this order for a period of five (5) years.

17. This order shall be governed by and construed in accordance with the laws of the Commonwealth of Virginia without giving effect to its choice of law rules.

# ALBRIGHT & WILSON Americas

Form 10003 (12/88)

## REQUISITION/PURCHASE ORDER

Shipping: 2151 King Street Extension  
Charleston, South Carolina  
29405-8339

Mailing: 2151 King Street Extension  
Charleston, South Carolina  
29405-8339



Albright & Wilson Americas  
a Tenneco Company

803-740-5200  
FAX 803-740-5230

Attention:

DATE: <b>2/24/95</b>	ACCOUNT <b>750551.7539</b>	TAXABLE	TAX EXEMPT <input checked="" type="checkbox"/>	ORDER NO: <b>C 94383</b>
PROJECT: <b>988 - DEHPA</b>		SC EXEMPT #SC 12811 (19)		

TO: **Cedar Chemical**  
**Attn: 242 South**  
**W. Helena, AK 72390**

INVOICES MUST BE RENDERED IN DUPLICATE TO THE ABOVE  
ADDRESS: ATTENTION ACCOUNTING DEPARTMENT

Payment Terms: **10-30**

Delivery Terms: FOB:

Ship Via:

Date Required at Destination: **2-28-95**

Confirming To:

Confirming Date:

PLEASE ENTER OUR PURCHASE ORDER ("ORDER") FOR THE FOLLOWING, SUBJECT TO THE TERMS AND CONDITIONS SET FORTH ON THE FACE AND BACK OF THIS ORDER. IMPORTANT - THIS ORDER EXPRESSLY LIMITS ACCEPTANCE TO TERMS AND CONDITIONS STATED ON THE FACE AND BACK HEREOF, AND ANY ADDITIONAL OR DIFFERENT TERMS AND CONDITIONS PROPOSED BY THE SELLER SHALL BE DEEMED MATERIAL ALTERATIONS HEREOF AND ARE REJECTED IN ACCORDANCE WITH PARAGRAPH 1 ON THE REVERSE SIDE UNLESS EXPRESSLY AGREED TO BY BUYER IN WRITING. IF SELLER COMMENCES SHIPMENT PURSUANT TO THIS ORDER, THEN SELLER SHALL, AS OF THE DATE SELLER HAS COMMENCED SHIPMENT, BE DEEMED TO HAVE AGREED TO AND ACCEPTED THIS ORDER IN ITS ENTIRETY, INCLUDING ITS TERMS AND CONDITIONS.

ITEM NO.	QUANTITY	U/M	CODE NUMBER	DESCRIPTION	U/M PRICE
1	1	ea		Cedar will produce 400,000 pounds of DEHPA at a total fee of \$0.38 per pound.	
				A&W will supply all raw materials except Caustic, which Cedar will invoice us for their invoice price.	
				A&W will arrange transportation for finished product.	
				Cedar will dispose of waste and which A&W at Cedar's invoice cost.	
TOTAL \$					

### IMPORTANT

SHOW ORDER NUMBERS ON ALL PACKAGES, INVOICES, PACKING LISTS, AND SHIPPERS RECEIPTS.

ATTACH ORIGINAL BILL OF LADING OR EXPRESS RECEIPT AND RECEIPTED BILL FOR PREPAID TRANSPORTATION TO INVOICE.

ALL ITEMS MUST BE IDENTIFIED WITH MANUFACTURER'S NAME ON YOUR INVOICE.

PRICES SHOWN SHALL BE FOR PRODUCT ONLY. APPLICABLE TAXES SHALL BE STATED SEPARATELY.

TRANSPORTATION CHARGES ARE NOT TAXABLE. PLEASE BILL AS A SEPARATE ITEM ON YOUR INVOICE.

PLEASE ADDRESS ALL CORRESPONDENCE TO: ATTENTION OF PURCHASING DEPARTMENT.

By: \_\_\_\_\_  
Purchasing Department

I the undersigned Representative of the Supplier accept this Purchase Order and all conditions thereon and will make delivery on \_\_\_\_\_ 19\_\_\_\_

TITLE

Prepared By:

Authorized Signature

Signature Limitations  
\$

Only Signatures Appearing on Signature Authorization Form with limitations shown will be accepted.

VENDOR ACKNOWLEDGEMENT

## PURCHASE TERMS & CONDITIONS

1. This purchase order ("order") is limited to the terms and conditions contained on the face and the back hereof. Any proposal for additional or different terms and conditions or any attempt by Seller to vary the terms and conditions of this order in Seller's acceptance shall be deemed a material alteration of the terms hereof rather than a rejection, and this order shall be deemed accepted without the inclusion of such material alterations. Different terms and conditions proposed by Seller or contained in Seller's documents are hereby objected to and rejected. Delivery by Seller of the products or services covered by this order shall be deemed an acceptance by Seller of this order. In addition, any terms stated in Seller's offer, bid, proposal or confirmation shall not become part of this order and if this order shall be deemed to be an acceptance of an offer made by Seller, such acceptance is expressly conditioned upon Seller's acceptance of the terms hereof.

2. Seller warrants good title to the products, that the transfer of the products is rightful, that the products are free from any valid claim of infringement of any third party intellectual property rights, and that the products are delivered free from any security interest or other lien or encumbrance. Seller agrees to indemnify and hold Buyer harmless from and against any claims or liabilities for infringement of a third party intellectual property right based on Buyer's sale, use, or purchase of products or services sold by the Seller. Seller shall defend any such suits at its own expense, and Buyer shall have the right to have such litigation monitored by its own counsel. In the event any product or service is found to be infringing, Seller shall, at Buyer's option, (i) procure appropriate licenses for Buyer's continued use as intended, (ii) modify the products or services in order to eliminate any infringement, and/or (iii) pay all costs and expenses incurred by Buyer due to the infringement.

3. Seller warrants that the products shall conform to all specifications, descriptions and samples either provided by Buyer to Seller or provided by Seller and adopted by Buyer. Seller warrants the products shall be free from defects in material, workmanship and design, shall be merchantable, and shall be fit for the intended purpose. Any products not as warranted shall, at Buyer's option, be repaired or replaced by Seller at no additional cost to Buyer or, at Buyer's option, Seller shall refund the purchase price and transportation costs applicable thereto. Any products so repaired or replaced shall be covered by the foregoing warranties from the date of such repair or replacement. Buyer reserves the right to inspect any products and reject or revoke acceptance upon any inspection thereof; provided, however, Buyer's failure to inspect or failure to find any defect shall not operate as a waiver of Buyer's rights hereunder. Seller's obligations under this order shall survive inspection, test, acceptance, use or payment by the Buyer.

4. Seller warrants that the products and/or services comply with all applicable federal, state and local statutes, laws, ordinances, codes, executive orders, and other orders, rules and regulations applicable to the products and/or services (including packaging). Seller specifically warrants, to the extent applicable, that the products or services purchased hereunder have been produced or furnished in complete compliance with the Fair Labor Standards Act, Executive Order No. 11246 (Equal Employment Opportunity) and similar laws and orders, as the same may be amended. Seller agrees to execute, upon Buyer's request, Buyer's standard form of Certification of Compliance with such laws and orders which Certification shall become a part hereof upon execution.

5. Seller warrants, to the extent applicable, that all products comply in all respects with (i) the requirements of the Occupational Safety and Health Act and all of the regulations, orders and standards promulgated thereunder, and (ii) Federal Hazardous Substances Act, Federal Poison Prevention Packaging Act and similar regulations governing hazardous materials including regulations issued by the Department of Transportation and recommendations of the United Nations on the transport of dangerous goods. Seller agrees to provide Buyer with Material Safety Data Sheets and all other information reasonably necessary to assist Buyer in the safe handling and use of the products.

6. Neither party shall be liable for failure or delay in performance of this order due in whole or in part to an act of God, labor dispute, civil commotion, sabotage, fire, acts of government or any other similar or dissimilar cause beyond the reasonable control of the affected party which renders such party's performance commercially impracticable under the Uniform Commercial Code. Seller shall notify Buyer immediately of its inability to perform. For the duration of Seller's inability to perform, Buyer may acquire products and services Buyer deems necessary from third parties without incurring liability to Seller and Buyer may deduct the quantity of such products and services from this order. If the period of non-performance extends beyond 30 days, Buyer may, at his option, cancel this order without liability. During any period of reduced output, Seller agrees to fairly allocate available supply to Buyer unless Buyer gives notice to the contrary.

7. Seller shall pay all taxes except such taxes which, by law, must be paid by Buyer. Seller shall notify Buyer of any taxes which Buyer is required to pay by forwarding documentation to Buyer of such statutory obligation.

8. The price for the product shall be as set forth on the front of this order. Should Buyer during the term of this order be able to purchase the same grade of products at a price resulting in a lower delivered cost to Buyer than the delivered cost hereunder and furnish Seller satisfactory proof of same, then Seller shall either meet such lower delivered cost or permit Buyer to purchase elsewhere. Quantity so purchased shall be deducted from the quantity covered by this order. Invoices shall be dated no earlier than the date of shipment and shall be mailed within 24 hours of shipment. Discounts will be calculated from the date of receipt of such invoice. Other payment terms shall be as set forth on the face hereof. Any prepaid transportation charges shall be separately stated on Seller's invoice.

9. Unless otherwise agreed, Seller shall prepay all transportation charges, and risk of loss and title to the product shall pass upon delivery to Buyer or upon delivery at the destination designated by Buyer.

10. Seller assumes all risk of loss of or damage to any property of Buyer entrusted to Seller while in Seller's possession and control. In the event of loss of or damage to such property, Seller shall promptly reimburse Buyer for the value of the Property or promptly repair such property at Seller's sole expense.

11. Seller agrees to hold Buyer, its affiliates, subsidiaries and parent, and their respective officers, directors and employees ("Indemnitees") harmless and indemnify such Indemnitees from and against any claims, losses and liabilities (including attorneys fees) arising from Seller's negligence, gross negligence or willful misconduct, breach of any warranty or other obligation hereunder. Seller shall not be liable for incidental or consequential damages except to the extent related to personal injury or property damage to Buyer or third parties caused by Seller's breach of any warranty, negligence, gross negligence, or willful misconduct.

12. Seller shall not, without Buyer's prior written consent, assign this order or any part of this order. Subject to the foregoing, this order shall be binding upon and inure to the benefit of the successors and permitted assigns of the parties.

13. Buyer has the right to terminate this contract in whole or in part at any time by written notice to Seller. In such event, Seller may claim only properly supported out-of-pocket costs plus a reasonable amount of demonstrable related charges for the work already performed, all to be determined in accordance with generally accepted accounting procedures. For specially prepared products, unique to Buyer's order, any partially completed work or raw materials whose full costs are included in the termination charges shall be identified in writing and held by Seller for disposition in accordance with Buyer's written instructions. Notwithstanding the foregoing, Buyer reserves the right to cancel all or any part of the undelivered portion of this order, without liability.

14. Time is of the essence and Seller's failure to complete delivery within the time specified, or a reasonable time if no time is specified, shall constitute a material breach hereof. Upon such breach, Buyer may, at its option, terminate this order without liability.

15. This order constitutes the entire agreement of the parties and all previous contracts, orders, proposals, bids and communications are hereby superceded (i) unless explicitly incorporated by reference herein, or (ii) unless specifically superceded by term(s) of a contract duly executed by Buyer and Seller applicable to the products described on the face hereof. This order may not be amended or modified without Buyer's written consent. If any provision of this order shall be considered invalid or unlawful, the remaining provisions shall remain in force and effect. Buyer's failure to exercise any right or remedy hereunder shall not constitute a waiver.

16. Seller shall hold any information provided to Seller by Buyer or developed by Seller for Buyer hereunder in confidence and shall not disclose such information without Seller's consent. This obligation shall survive the termination of this order for a period of five (5) years.

17. This order shall be governed by and construed in accordance with the laws of the Commonwealth of Virginia without giving effect to its choice of law rules.

# ALBRIGHT & WILSON Americas

Form 10003 (12/88)

## REQUISITION/PURCHASE ORDER

Shipping: 2151 King Street Extension  
Charleston, South Carolina  
29405-8339

Mailing: 2151 King Street Extension  
Charleston, South Carolina  
29405-8339



Albright & Wilson Americas  
a Tenneco Company

803-740-5200  
FAX 803-740-5230

Attention:

DATE: 6/6/94	ACCOUNT 750551.0620	TAXABLE	TAX EXEMPT	ORDER NO: C 90160
PROJECT:		SC EXEMPT #SC 12811 (19)		

TO: Dave Hoggel  
Cedar Chemical

INVOICES MUST BE RENDERED IN DUPLICATE TO THE ABOVE  
ADDRESS: ATTENTION ACCOUNTING DEPARTMENT

Payment Terms:

Delivery Terms: FOB: net 30 daysShip Via: ATW to make arrangementsDate Required at Destination: Aug. 1, 1994 (start)

Confirming To:

Confirming Date:

PLEASE ENTER OUR PURCHASE ORDER ("ORDER") FOR THE FOLLOWING, SUBJECT TO THE TERMS AND CONDITIONS SET FORTH ON THE FACE AND BACK OF THIS ORDER. IMPORTANT - THIS ORDER EXPRESSLY LIMITS ACCEPTANCE TO TERMS AND CONDITIONS STATED ON THE FACE AND BACK HEREOF, AND ANY ADDITIONAL OR DIFFERENT TERMS AND CONDITIONS PROPOSED BY THE SELLER SHALL BE DEEMED MATERIAL ALTERATIONS HEREOF AND ARE REJECTED IN ACCORDANCE WITH PARAGRAPH 1 ON THE REVERSE SIDE UNLESS EXPRESSLY AGREED TO BY BUYER IN WRITING. IF SELLER COMMENCES SHIPMENT PURSUANT TO THIS ORDER, THEN SELLER SHALL, AS OF THE DATE SELLER HAS COMMENCED SHIPMENT, BE DEEMED TO HAVE AGREED TO AND ACCEPTED THIS ORDER IN ITS ENTIRETY, INCLUDING ITS TERMS AND CONDITIONS.

ITEM NO.	QUANTITY	U/M	CODE NUMBER	DESCRIPTION	U/M PRICE
				<u>Cedar Chemical to modify</u> <u>its No # 4 unit and produce</u> <u>3 mm forend of T.P. And</u> <u>will take the product over</u> <u>a 10 month period of time.</u> <u>The Condition for Cedar to</u> <u>produce the 3mm lbs. are</u> <u>per Jeff Proth's letter to</u> <u>John Hastings Dated MAY 18, 1994.</u> <u>(copy attached)</u>	
TOTAL \$					

**IMPORTANT**

SHOW ORDER NUMBERS ON ALL PACKAGES, INVOICES, PACKING LISTS, AND SHIPPERS RECEIPTS.

ATTACH ORIGINAL BILL OF LADING OR EXPRESS RECEIPT AND RECEIPTED BILL FOR PREPAID TRANSPORTATION TO INVOICE.

ALL ITEMS MUST BE IDENTIFIED WITH MANUFACTURER'S NAME ON YOUR INVOICE.

PRICES SHOWN SHALL BE FOR PRODUCT ONLY. APPLICABLE TAXES SHALL BE STATED SEPARATELY.

TRANSPORTATION CHARGES ARE NOT TAXABLE. PLEASE BILL AS A SEPARATE ITEM ON YOUR INVOICE.

PLEASE ADDRESS ALL CORRESPONDENCE TO: ATTENTION OF PURCHASING DEPARTMENT.

By: \_\_\_\_\_  
Purchasing Department

I the undersigned Representative of the Supplier accept this Purchase Order and all conditions thereon and will make delivery on \_\_\_\_\_ 19\_\_\_\_

TITLE

Prepared By: \_\_\_\_\_

Authorized Signature

Signature Limitations  
\$

Only Signatures Appearing on Signature Authorization Form within limitations shown will be accepted.



5100 Poplar Avenue • Suite 2414 • Memphis, TN 38137 • (901) 685-5348 • Fax (901) 684-5398

May 18, 1994

Peter C. Hastings  
Business Development Manager  
Albright & Wilson Americas, Inc.  
100 Lakeridge Pkwy  
PO Box 26229  
Richmond, VA 23260-6229

Dear Pete:

This is to confirm our conversation of May 12, 1994, regarding the production of TTP.

Cedar proposes to produce 3MM lbs. of TTP commencing as soon as possible in 1994 for a processing fee of \$.15/lb of product. This processing fee includes all services necessary to produce the product excluding the provision of raw materials, nitrogen, and packaging supplies. The unit processing fee is contingent upon Cedar being able to meet or exceed 75% of the base estimated daily productivity of 30,000 lbs of product. In the event that Cedar is unable to reach this productivity within a reasonable period after start up due to inability of A&W's process to perform, then we reserve the right to re-negotiate a new unit price in order to maintain an equivalent revenue stream.

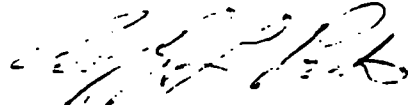
In order to complete the manufacture it will be necessary for Cedar to modify its #4 Unit at an estimated cost of \$100,000. We propose that this cost be amortized over the 3MM lbs. of product at the rate of \$ .033/lb. Thus the total fee to be charged A&W will be \$.183/lb of TTP processed.

As we have discussed, we consider this a short range procedure for the manufacture of TTP because hydrochloric acid will be absorbed using caustic soda and the resulting salt solution will cause difficulty with our on-site biological system if we were to produce TTP in large volumes over a long period of time. If the next phase of this project develops, which will entail the manufacture of 6MM/yr of TTP, we would propose that a scrubber system be installed to produce marketable grade muriatic acid, which would remove the need for on-site disposal. During our discussions you agreed that Albright & Wilson would be responsible for marketing this product. At the appropriate time we can develop a capital estimate for this continuing phase of the project.

At the moment we are estimating that production could begin in July and subject to receiving your purchase order we will make every effort to shorten the time before start up commences.

I hope that this is sufficient information for your needs. Please let me know if clarification or additional information is required. We appreciate your continuing confidence in Cedar and hope that this project will be successful for both our companies.

Sincerely,

A handwritten signature in dark ink, appearing to read 'Geoffrey L. Pratt', is written over the typed name.

Geoffrey L. Pratt, Vice President  
Custom Manufacturing & Specialty Chemicals

GLP:lc



CEDAR CHEMICAL -- WEST HELENA  
INTER-COMPANY MEMO

June 21, 1994

TO: Dave Hoppel  
M. J. Pocrass  
Bob Christian  
Ed White  
Hollie Ayers  
Guinn Cantrell  
Floy Estes  
Russell Fairchild  
Bill Gastrock  
Joe Forthman  
Ken Howard  
Richard Johns  
Rita Ketchum  
Jim Krusling  
Tom Lodice  
Bud Oberle  
Robert Ray  
Norman Rowan  
Greg Satterfield  
Beaver Schaffhauser  
Patrick Schweikert  
Barbara Tucker  
Joel Walker  
Lisa Walker

FROM: Neil Robbins

SUBJECT: Product & Department Numbers

Attached is the latest list of Product Numbers & Department Numbers.

Please note the change of Product Number 85 to A&W-TTP.

If you have any questions give me a call.

Thanks

A&W-TTP 130X PROD GROUP FILE

PROD # PLANT 85

PROD GRP

PROD GRP

PROD # sys 83X 585X

PEL # 780 X

C3685-4300 SALES X

5350 X

## TTP PROCESS ANALYSIS

WE HAVE A NEW PRODUCT FOR A&W. IT IS OUR PLAN TO MODIFY					
UNIT 4 TO BE ABLE TO RUN THIS SIMULTANEOUSLY WHILE WE RUN					
ADPA OR GRAPH SIZE (NOT DEHPA). EVERYTHING WILL COME IN					
AND GO OUT IN TANK TRUCKS AT FIRST. WE'LL NEED A NEW					
NUMBER FOR THIS NEW PRODUCT.					
REACTOR SIZE (GAL)				4,000	
EXPECTED RUN TIME PER BATCH				24 HOURS	
POUNDS PER				BATCH	# OF TTP
RAW MATERIAL					
PCI3				12,800	0.4000
CRESOLS				29,740	0.9294
UTILITY NITROGEN					
N2				20,000	0.6250
WASTES					
HCl				9,976	0.3118
100% NaOH (FOR NEUTRALIZATION)				10,933	0.3416
NaCl (AFTER NEUTRALIZATION)				15,989	0.4997
YIELD				32,000	
cc: BRC MJP GES					
TJL WNR EJW					



P. O. Box 2749 • Hwy. 242 • West Helena, AR 72390 • (501)

March 27, 1995

Mr. J. L. Crawford  
Albright & Wilson Americas  
P. O. Box 70399  
Charleston, SC 29415-0399

Dear Jimmy:

I have tried to finally summarize the TTP equipment installation costs. I have attached Tom Lodice's note to me regarding the cost itemization. We can talk about any of these if you need further explanation. Based on this summary, I see the cost picture as follows:

Investment Reimbursement (IR) due	\$135,711
IR already billed:	
1994	158,230# @ \$0.033/# \$ 5,222
1995 YTD	67,800# @ \$0.033/# \$ 2,237
Total IR Billed	\$ 7,459
IR Remaining	\$128,252

IR Adder to base price of \$0.15/# if remaining 1995 volume is:	
2,773,970# (make total take 3MM#)	\$ 0.046/#
3,000,000# (take another 3MM# in 1995)	\$ 0.043/#
3,886,424# (enough to get adder to \$0.033)	\$ 0.033/#

These are just a few scenarios as to how we can get the proper adder to make Cedar whole. From a practical view point, I think we would have a hard time fitting in the 3.9MM # level, so I think it is appropriate to look at increasing the adder now, so we won't get caught short. I suggest that we look at a \$0.045/# adder for now, until we sort it out. We have already sent out our March billing, so we have to come to some sort of agreement in the next few weeks, so we can get it into place for the April billing.

After you have had a chance to review this, let me know what comments you have, and what we need to discuss.

Sincerely,

*David Hoppel*  
David V. Hoppel

*WNR*  
*Unless I tell you otherwise, let's charge A + W*  
$$\begin{array}{r} 0.15 \\ + 0.043 \\ \hline \$0.193/\# \end{array}$$
*for TTP*  
*DVH*  
*4/27*

**Shipping: 2151 King Street Extension  
Charleston, South Carolina  
29405-8339**

**Mailing: 2151 King Street Extension  
Charleston, South Carolina  
29405-8339**



**Albright & Wilson Americas  
a Tenneco Company**

**803-740-5200**  
**FAX 803-740-5230**

**Attention:**

DATE: 2-10-94	ACCOUNT 750551-0620	TAXABLE	TAX EXEMPT	ORDER NO: C 86110
	PROJECT: APPA + OEHHA	SC EXEMPT #SC 12811 (19)		

TO: Cedar Chemical Corp  
W. Helena AR

INVOICES MUST BE RENDERED IN DUPLICATE TO THE ABOVE  
ADDRESS: ATTENTION ACCOUNTING DEPARTMENT

Confirming To: Dave Hoppel

**Payment Terms:****Delivery Terms: FOB:**

**Ship Via:**

**Date Required at Destination:**

PLEASE ENTER OUR PURCHASE ORDER ("ORDER") FOR THE FOLLOWING, SUBJECT TO THE TERMS AND CONDITIONS SET FORTH ON THE FACE AND BACK OF THIS ORDER. IMPORTANT - THIS ORDER EXPRESSLY LIMITS ACCEPTANCE TO TERMS AND CONDITIONS STATED ON THE FACE AND BACK HEREOF, AND ANY ADDITIONAL OR DIFFERENT TERMS AND CONDITIONS PROPOSED BY THE SELLER SHALL BE DEEMED MATERIAL ALTERATIONS HEREOF AND ARE REJECTED IN ACCORDANCE WITH PARAGRAPH 1 ON THE REVERSE SIDE UNLESS EXPRESSLY AGREED TO BY BUYER IN WRITING. IF SELLER COMMENCES SHIPMENT PURSUANT TO THIS ORDER, THEN SELLER SHALL, AS OF THE DATE SELLER HAS COMMENCED SHIPMENT, BE DEEMED TO HAVE AGREED TO AND ACCEPTED THIS ORDER IN ITS ENTIRETY, INCLUDING ITS TERMS AND CONDITIONS.

THIS ORDER, THEIR SELLER SHALL, AS OF THE DATE SELLER HAS COMMENCED SHIPMENT, BE DEEMED TO HAVE AGREED TO AND ACCEPTED THIS ORDER IN ITS ENTIRETY, INCLUDING ITS TERMS AND CONDITIONS.					
ITEM NO.	QUANTITY	U/M	CODE NUMBER	DESCRIPTION	U/M PRICE
				See Attachment	
				Xc! WNR G. PRATT BRC ESW	
				I'm not sure that we can do all of this stuff yet.	
				DVAH 2/24.	
				TOTAL \$	

**IMPORTANT**

SHOW ORDER NUMBERS ON ALL PACKAGES, INVOICES, PACKING LISTS, AND SHIPPERS RECEIPTS.

ATTACH ORIGINAL BILL OF LADING OR EXPRESS RECEIPT AND RECEIPTED BILL FOR PREPAID TRANSPORTATION TO INVOICE.

ALL ITEMS MUST BE IDENTIFIED WITH MANUFACTURER'S NAME ON YOUR INVOICE

PRICES SHOWN SHALL BE FOR PRODUCT ONLY. APPLICABLE TAXES SHALL BE STATED SEPARATELY.

TRANSPORTATION CHARGES ARE NOT TAXABLE. PLEASE BILL AS A SEPARATE ITEM ON YOUR INVOICE

PLEASE ADDRESS ALL CORRESPONDENCE TO: ATTENTION OF PURCHASING  
DEPARTMENT

By: \_\_\_\_\_  
Purchasing Department

Received in good order except: \_\_\_\_\_

By: \_\_\_\_\_  
Receiving Department

**Prepared By:**

**Authorized Signature**

### Signature Limitations

Only Signatures Appearing on Signature Authorization Form within limitations shown will be accepted.

**ATTACHMENT TO:**

**ALBRIGHT & WILSON AMERICAS  
FEBRUARY 10, 1994**

**REQUISITION/PO NO. C-86110**

**ITEM NO. 1            DESCRIPTION**

**CEDAR CHEMICAL CORPORATION will produce 800K pounds of ADPA 60AW at a charge of \$ 0.16 per pound and a one-time capital improvement cost of \$25,000. CEDAR will also produce 350K pounds of DEHPA at a charge of \$ 0.38 per pound. These campaigns will be processed consecutively, beginning approximately March 1, 1994.**

**ITEM NO. 2**

**CEDAR CHEMICAL CORPORATION will produce 800K pounds of ADPA 60AW at a charge of \$ 0.16 per pound and followed by 750K pounds of DEHPA at a cost of \$ 0.38 per pound. These campaigns to begin mid-May 1994.**

**ITEM NO. 3**

**CEDAR CHEMICAL CORPORATION will produce 750K pounds of DEHPA at a charge of \$ 0.38 per pound and beginning mid-September 1994.**

**ALBRIGHT & WILSON will supply sufficient raw materials to allow CEDAR to operate in continuous campaigns.**

**All off-plant waste disposal will be handled by CEDAR. ALBRIGHT & WILSON will pay invoice price for this disposal.**

**All aqueous waste will be disposed of at CEDAR's expense. ALBRIGHT & WILSON will reimburse CEDAR for all caustic used to neutralize the HcL generated from the DEHPA process.**

**All transportation arrangements will be made by A&W, and at A&W's expense.**

**All finished products must meet A&W's specifications supplied in the A&W process procedures.**

**A&W would like to keep open an option to authorize, at a later date, production of 750K pounds of DEHPA and/or 1,000K pounds of ADPA at the same cost and conditions. This campaign would begin in November 1994.**

February 1, 1993

**MEMORANDUM**

Fm: John Wagner

To: David Hoppel  
M.J. Pocrass

cc: B. Christian  
R. Johns  
T. Lodice  
N. Robbins  
D. Schaffhauser  
P. Schweikert  
J. Vincent  
J. Walker  
Jo. Williams  
J. Zink

**Re: Review of Emergency Response Concerns, 12/20/93 Unit 4 Incident**

Addressing the concerns of the January 27 meeting is not so much an issue of modifying the Emergency Response Plan (Section 1-009), as it is an issue of ensuring that plant personnel read, and are trained in, these emergency incident procedures.

After reviewing the individual observations listed in the summary letter of the January 28 meeting, all concerns, except the gate guard's responsibilities, are already addressed in Section 1-009. The directions for contractors and client personnel will be covered in Section 2-003.

My recommendation for clarifying the guard's responsibilities would be to add the following two paragraphs to item 2.2 of Section 1-009:

5. The SHIFT SUPERVISOR should determine if the severity of the incident warrants controlling access through the main gate. If so, instruct the MESSENGER to notify the gate guard, either over the P.A. system, telephone or radio, of the nature of the emergency, and that the gate should be secured to all but off-site emergency personnel, or to plant personnel whose presence has been requested by the shift supervisor, or is required by this plan.

6. The GATE GUARD, upon being notified that the main gate is to be secured, should not allow anyone to enter other than those persons identified in paragraph 5. Persons can be allowed to exit the plant.

2.

Recommendations from my discussion with David Hoppel will also be incorporated into the revision of this section.

This plan can incorporate only a limited amount of detail on different responsibilities under different circumstances. It is my recommendation that during the training phase that each department head prepare a job specific training outline that goes into as much detail as they think is necessary to ensure that their people respond properly and adequately to any incident.

A handwritten signature, possibly reading "JW", is located in the lower right quadrant of the page.



**CEDAR INTERNAL CORRESPONDENCE**

cc: B. Christian      P. Schweikert\*  
D. Hoppel      J. Vincent\*  
R. Johns      J. Walker\*  
T. Lodice      Jo. Williams\*  
N. Robbins      J. Zink

To: D. Schaffhauser\*  
J. Wagner

From: M. J. Pocrass\*

Date: January 29, 1993

Subject: Review of Emergency Response to 12/20/92 Unit 4 Incident :  
Correction to 1/28/93 Memo

A meeting was held on January 27, 1993 to "critique" the response to the incident which occurred on December 20, 1992 during the startup of the ADPA 60 process. A memo was issued on January 28, 1993 documenting the meeting. A list of observations was presented. This memo is issued to correct item 7. on that list. Item 7. should now read as follows :

7. D. Schaffhauser spoke to the West Helena fire chief after returning from being out of town at the time of the incident. At the incident itself, R. Johns relayed to the fire chief for D. Hoppel that the situation was under control such that the fire department could leave.

Incorporate this as appropriate in the process you are carrying out to modify Section 1-009 of the Health, Safety and Environmental Manual, which addresses emergency response.

If you have any questions, please let me know.

  
M. J. Pocrass

\* attendees at 1/27/93 meeting

**CEDAR INTERNAL CORRESPONDENCE**

cc: B. Christian      P. Schweikert\*  
D. Hoppel      J. Vincent\*  
R. Johns      J. Walker\*  
T. Lodice      Jo. Williams\*  
N. Robbins      J. Zink\*

To: D. Schaffhauser\*  
J. Wagner

From: M. J. Pocrass\*

Date: January 28, 1993

Subject: Review of Emergency Response to 12/20/92 Unit 4 Incident

A meeting was held on January 27, 1993 to "critique" the response to the incident which occurred on December 20, 1992 during the startup of the ADPA 60 process. For completeness, I have attached the near miss report and D. V. Hoppel's followup memo to all plant employees.

Briefly, observations were made of items of concern in the plant performance for handling the emergency. Additionally, a plan of action to address these concerns was defined.

Listed below are the observations :

1. There no was no clearly identified one person "in charge".
2. Representatives of the customer, Albright & Wilson, were present.
3. Two operators from Unit 1 came to help; this help was not requested.
4. Frank Lawson of A & W directed P. Sckweikert to call the West Helena Fire Department because of high temperature in the stripping vessel, R-4101.
5. Concerns surrounding the emergency callout list :
  - a. Does the designated person making the call (s) have all the pertinent information about the emergency ?
  - b. Does the designated person making the call (s) know who to call, and, if so, in the proper order ?
6. John Wagner was not present. This was because he was not notified as he should have been.
7. D. Schaffhauser spoke to the West Helena fire chief after returning from being out of town at the time of the incident. The West Helena fire chief was contacted by R. Johns at the time of the incident. Was this the right way for the fire chief to be contacted ?

8. There was a lack of traffic control at the front gate, tantamount to " uncontrolled access ".
9. The roles that personnel are vaguely defined.
10. The R-4101 agitator starter box had been moved. Operating personnel were not informed of this change.
11. Operator training covering response to unusual conditions is at best weak and at worst non-existent.
12. The technology exchange between A & W and Cedar was weak. For example, the reason why high temperatur was such a concern ( see 4. above ) was not conveyed.
13. Johnny Williams, the Utility Operator on duty, was not told what the emergency was, just that there was an emergency.
14. Cedar employees not scheduled to be working at the time of the incident came to the plant to help.
15. Each person must know what role they are to play in an emergency before an emergency occurs.
16. J. Vincent was " surprised " to see the fire department arrive.
17. Clarify the issue of who is " in charge " when the fire department is called.

Review the list of observations and compare them to Section 1-009 of the Health, Safety and Environmental Manual, which addresses emergency response. Modify the plan as needed to address the concerns and submit the proposed modified plan to D. V. Hoppel by February 5, 1993. Once a final version of the modified plan is issued, retraining of employees and a drill will follow.

To assist you these other comments/issues were mentioned :

1. Truck drivers and contractors need to be covered somehow.
2. There is a communication issue, i.e. we require a reliable way to spread information.
3. Front office personnel must be properly incorporated.
4. Do we need " rules of conduct " for customer representatives on site for a startup ?
5. There are two main issues :
  - a. The emergency and the response
  - b. Assessing the need to evacuate and the actual evacuation

If you have any questions, please let me know.

  
M. J. Pocrass

\* attendees  
Attachments ( 2 )



P.O. Box 2749 • Hwy. 242 • West Helena, AR 72390 • (501) 572-3701 • Fax (501) 572-3795

January 26, 1993

Mr. J. L. Crawford  
Albright & Wilson Americas  
P. O. Box 70399  
Charleston, SC 29415-0399

Dear Jimmy:

Now that the ADPA process has settled down, we are in a position to go from the per diem to the per pound cost as per our contract. Based on the attached detail of run times and yields, it appears that an appropriate transition would be that as of batch #18 we will start charging on a per pound basis. This means that we will charge you for a per diem rate up to and including January 17.

We still have issues surrounding the equipment damaged in the December episode and with respect to potential lost time if we shut down due to lack of room for final product or acetic acid storage. For the former, I will shortly send you a compilation of the damaged equipment (primarily the TFE lined circulation pump) and we can then resolve this issue. On the latter, if our lost production time gets to be excessive, I think that a short term "stand by" fee at the contract per diem is appropriate. Obviously both of these items need some discussion before they can be fully settled.

Hopefully the billing proposal meets with your agreement. Please let me know if you have any questions.

Sincerely,

*David V. Hoppel*  
David V. Hoppel

cc: P. Hastings (A&W)  
G. Pratt  
N. Robbins

(Data from R-4101 Strip)

[illegible]

D. Hoppet → WNR

## TOLLING AGREEMENT

THIS AGREEMENT is made as of December 15, 1992, by and between ALBRIGHT & WILSON AMERICAS INC., a Delaware corporation, with its principal office at 100 Lakeridge Parkway, Ashland, Virginia 23005 ("A&W") and CEDAR CHEMICAL CORPORATION, a Delaware corporation with its principal office at 5100 Poplar Avenue, Memphis, TN 38137 (hereinafter "Cedar").

### WITNESSETH:

WHEREAS, A&W has developed and currently possesses certain proprietary technology and processes for the manufacture of BRIQUEST®-ADPA (acetodiphosphonic acid) (the "Product") and is desirous of having the Product manufactured for it using such technology according to such process; and,

WHEREAS, Cedar possesses personnel and equipment necessary for the manufacture of the Product and is desirous of manufacturing the Product for A&W in accordance with the terms of this Agreement.

NOW THEREFORE, it is agreed as follows:

#### 1. DEFINITIONS

For purposes of this Agreement, the following terms shall have the meaning assigned thereto:

1.1 Acetic Acid Glacial shall mean the Raw Material meeting the specifications set forth in Exhibit A attached.

1.2 Acetic Anhydride shall mean Raw Material meeting the specifications set forth in Exhibit A attached.

1.3 Phosphorous Acid Flake shall mean Raw Material meeting the specifications set forth in Exhibit A attached.

1.5 "Raw Materials" shall mean any of the items in 1.1, 1.2 and 1.3, or all, as the Agreement requires. Raw Material usage targets are set forth on Exhibit C.

1.6 "Plant" shall mean Cedar's facility at West Helena, Arkansas.

1.7 "Product" shall mean BRIQUEST®-ADPA (acetodiphosphonic acid) and is more particularly described in Exhibit B attached.

1.8 "By-Product" shall mean Acetic Acid meeting the specifications stated on Exhibit D.

## 2. TERM

This Agreement shall commence as of December 15, 1992 and shall terminate on December 14, 1993, or on such earlier date on which Cedar shall have produced 4,000,000 pounds of Product for A&W hereunder or on such other date as the parties shall agree in writing, unless terminated or extended in accordance with this Agreement.

## 3. METHOD OF OPERATION

3.1 A&W shall furnish Cedar with, or cause it to be furnished with, Raw Materials meeting the specifications set forth in Exhibit A in amounts sufficient to enable Cedar to produce the quantities of the Product specified by A&W in accordance with this Agreement. The Product shall be packaged in bulk containers (tank cars or tank trucks) and will be arranged by A&W. In the event any of the Product is to be packaged in Drums, A&W will provide appropriate drums and in the event more than 10% of the Product is to be packaged in drums, A&W agrees to pay a reasonable negotiated drumming fee to Cedar.

3.2 Cedar shall provide at its Plant, receiving, storage, production and delivery facilities and services necessary to fully perform its obligations hereunder which shall include, without limitation, storage and production facilities, labor, supervision, laboratories and personnel, both technical and administrative. Cedar shall preserve and protect the Raw Materials and the Product from contamination, loss, theft, damage or destruction, and from attachment, levy, distraint or any other actions by Cedar's creditors, while in Cedar's possession. Cedar shall fully account periodically for all Raw Materials, work in process and the Product in its possession; shall keep such records relating thereto as A&W may reasonably request; and shall furnish A&W with a certificate of insurance that conforms with Cedar's undertakings described in Section 4 below.

3.3 Raw Materials shall be accepted according to Cedar's ordinary business practices. Cedar shall immediately advise A&W's designated representative of any non-conformities or defects in any such Raw Materials or failure of any of the Raw Materials to conform with specifications if it becomes aware of such non-conformities. A weight ticket and certificate of analysis shall be provided by A&W, or its supplier for every shipment of Raw Materials.

3.4 Cedar shall ship the Product in accordance with A&W's instructions. In connection with each such shipment, Cedar shall prepare a certificate of analysis (See Section 5.1(v)) and bill

of lading in a form approved by A&W and, immediately after a shipment is made, Cedar will send a copy of such bill of lading and certificate of analysis to A&W.

#### 4. TITLE AND RISK OF LOSS

4.1 Title to the A&W Raw Materials delivered by A&W, or its supplier, to Cedar, shall at all times remain solely in A&W; the Raw Materials and the Product shall be segregated from other materials and goods of Cedar and Cedar shall take such steps, including posting signs indicating the consignment by A&W of such Raw Materials.

4.2 The risk of loss of Raw Materials and the Drums delivered by A&W or its suppliers shall remain with A&W until delivery of such Raw Materials to the Plant; thereafter, the risk of loss shall be on Cedar. Cedar shall maintain insurance in appropriate form and amount covering the Raw Materials and the Product.

4.3 The risk of loss of the Product produced hereunder shall be A&W's on and after each shipment leaves the Plant.

#### 5. PRODUCT QUALITY

5.1 The Product produced and delivered hereunder shall meet the specifications set forth in Exhibit B and shall have been produced, packaged and delivered in accordance with this Agreement and applicable laws, regulations and orders. To determine whether Product produced hereunder meets its specifications:

(i) Cedar shall draw one (1) sample from each batch in accordance with procedures specified by A&W and agreed to by Cedar. Each of said samples shall be marked with Cedar's name and batch number.

(ii) Cedar shall test one (1) of the batch samples in accordance with analytical methods and procedures agreed upon by Cedar and A&W. If the batch conforms to specifications set forth in Exhibit B, it will be approved for packing and shipments pursuant to this Agreement. Cedar shall hold the tested sample until the end of each production campaign and then ship such samples in accordance with A&W's instructions at A&W's expense. If A&W fails to provide shipping instructions within a reasonable time after the end of a campaign, Cedar may upon notice to A&W and at A&W's expense, dispose of the samples.



(iii) If a batch does not conform to specifications, Cedar shall immediately notify James Crawford or his designee, at Albright & Wilson Americas, 2151 King Street Extension, Charleston, SC 29405 by telephone (803) 740-5200 and mutually agree to a course of action.

(v) A Certificate of Analysis will be sent with each shipment of the Product with a copy to A&W.

5.2 In the event that the tests referred to above demonstrate that a shipment of the Product manufactured hereunder does not conform to the specifications set forth in Exhibit B, and such failure to conform is the result of Cedar's failure to correctly follow A&W's process or other failure to perform in accordance with this Agreement, Cedar, at its expense, shall produce a replacement batch that does conform with such specifications. In this case, Cedar shall pay for the Raw Materials to produce the conforming batch at the cost incurred by A&W to supply such Raw Materials.

## 6. PRODUCTION AND FEES

6.1 Cedar shall produce Product hereunder in facilities at its plant utilizing A&W's proprietary technology and process described in this Agreement and in Exhibit E attached. Production of Product shall commence as promptly as possible after the effective date of this Agreement. Cedar shall produce and A&W will pay toll fees for two million pounds of Product. Prior to Cedar's completion of production of two million pounds of Product, A&W will advise whether additional quantities of Product are desired so that production of such additional quantities may continue without interruption. A&W will not request production of a total amount in excess of four million pounds.

6.2 (a) The Toll Fee for the first two million pounds of Product produced for A&W during the term of this Agreement shall be \$0.20 per pound and the toll fee for amounts in excess of two million pounds up to four million pounds shall be \$0.15 per pound.

(b) In the event that A&W and Cedar through cooperative efforts cannot reach a production output hereunder of thirty thousand pounds of Product per day (and a commensurate quantity of By-Product per day) by the third production day, the toll fee shall be changed to U.S. \$8,000.00 per production day retroactive to the first production day with a minimum of 90% on stream factor until a thirty thousand pound per day production rate is achieved. As used herein, a production day shall mean 24 hours of continuous production while operating at no less than a 90% on-stream factor.

6.3 Cedar represents to A&W that Cedar's personnel are sufficiently experienced and knowledgeable to be able to implement the technology and procedures to be used by Cedar in the production of Product for A&W hereunder. Cedar represents that its plant facilities are capable of implementing A&W's proprietary technology and process. Cedar represents that it has the experience and facilities necessary to produce the Product and maintain continuous compliance with all applicable laws, regulations, rules and orders. A&W represents to Cedar that said technology and procedures do not infringe any patent and will indemnify Cedar against any claim for patent infringement asserted against Cedar arising out of its performance under this Agreement.

6.4 In the event A&W terminates this agreement or the agreement's term expires prior to the production of two million pounds of Product unless caused by Cedar's default, or force majeure affecting Cedar's ability to manufacture the Product or Cedar's inability to maintain a minimum of 90% on stream production; A&W agrees to pay (i) Cedar's documented costs for plant preparation and clean out fee not to exceed U.S. \$40,000.00, and (ii) \$0.05 per pound for amounts between the pounds of Product actually produced and two million pounds.

## 7. WASTE DISPOSAL

7.1 To the extent capable and permitted, Cedar shall handle the neutralization, storage and disposal of all aqueous wastes and by-products generated in the manufacture of the Product on-site. The parties do not anticipate that there will be any off-site waste disposal in connection with the manufacture of the Product. In the event off-site waste disposal is required, Cedar shall contract with fully licensed, permitted and authorized handlers to dispose of such waste. A&W will reimburse Cedar for off-site waste disposal. A&W shall have the right to audit all waste disposal related to the Product and its production hereunder. Cedar shall monitor the volume of all wastes generated and shall keep such records as are reasonably required by A&W and as required by local, state and federal authorities.

7.2 Except for the costs to be paid by A&W under 7.1 above and incidents, losses, costs, damages, fines, penalties, liabilities and expenses (including reasonable attorney's fees) resulting from A&W's misrepresentations and/or negligence, Cedar shall indemnify and hold A&W harmless against all loss, cost, damages, fines, penalties, liability and expense (including reasonable attorney's fees) arising out of Cedar's on-site disposal of waste and/or By-Products pursuant to this Section 7 including any violation of local, state and federal statute, ordinance, order, rules and/or regulation alleged as a result of such on-site waste disposal.

## 8. REPORTS AND AUDITS

8.1 Cedar shall supply A&W with production reports on forms agreed to by the parties, and such reports shall be sent to A&W at reasonable time intervals agreed upon by the parties.

8.2 A&W shall have the right to make, or have its auditors make, a stock audit (either physical or book inventory or both) from time to time and at such reasonable times as it may elect and A&W shall have access to Cedar's books and records for this purpose. A&W shall give reasonable notice of such election and shall carry out such audit so as not to interfere with the continued operation of the business of Cedar. Losses reported by Cedar or computed on the basis of A&W audits shall be the difference between (i) the original inventory or the inventory as of the preceding audit, plus deliveries to Cedar, less deliveries by Cedar on A&W's order; and (ii) the inventory as of the date of the current audit. Any payments for shortages shall be within 30 days of A&W's notification to Cedar and Cedar's acceptance thereof.

## 9. ACCESS TO PLANT; TECHNICAL SUPPORT

Cedar shall keep A&W fully and currently informed with respect to the production of the Product and shall afford access to A&W personnel to observe the production operation. A&W shall hold Cedar harmless from and indemnify it against all claims and liability on account of personal injury suffered by such A&W personnel while in Cedar's facility, except to the extent that such injury results from the negligence or willful misconduct of Cedar or its employees or agents.

Any technical support rendered by A&W personnel is based on information developed for A&W's own use and is given without representation and warranty.

## 10. PROCESS IMPROVEMENTS

10.1 Information developed in the course of, and solely related to, the production the Product hereunder shall be promptly disclosed to A&W. As between Cedar and A&W, such information except as it relates to improvements or changes to equipment or its operation, whether patentable or not, shall be the sole and exclusive property of A&W.

10.2 The parties have entered into a Secrecy Agreement dated as of November 1, 1992, which governs the disclosure of A&W's proprietary and confidential information and the use thereof by Cedar. The Secrecy Agreement is incorporated in this Agreement by this reference and shall, except as modified by 10.1 above, govern the rights of the parties related to the disclosure

and use of A&W's confidential information. In no event shall Cedar use A&W's proprietary and confidential information to compete or induce third parties to compete with A&W.

#### 11. TAXES

Cedar shall be responsible for, and will pay, all personal property taxes levied on A&W's property while in the custody of Cedar, and Cedar shall pay all taxes and fees in respect to or measured by the manufacture of the Product or the storage or delivery of A&W's property but Cedar shall not be responsible for and A&W shall be responsible for and shall pay all taxes in the nature of sales taxes levied on the Product delivered to A&W or at its direction. Cedar shall provide A&W with receipts for taxes paid by it hereunder for A&W's account.

#### 12. RIGHTS UPON TERMINATION

All Raw Materials, work in process and the Product remaining in Cedar's possession on termination of this Agreement shall be shipped to A&W or its designee at A&W's expense. Further, all drawings, reports and other data relating to the subject matter of this Agreement, which have been or are delivered to Cedar by A&W, shall be and remain the property of A&W and shall be destroyed or returned to A&W upon termination of this Agreement. Cedar is expressly prohibited from making copies of any such drawing, reports or other data supplied by A&W and related to the subject matter of this Agreement, other than as necessary to perform this Agreement.

#### 13. INDEMNIFICATION

Except with respect to indemnification pursuant to Section 7.2 of this Agreement:

13.1 Cedar acknowledges that it has been made aware of the nature of the Raw Materials and the Product. Cedar acknowledges that it has been supplied with the Material Safety Data Sheets for the Raw Materials and by-products and the Material Safety Data Sheets for the Product ("the Sheets"). Cedar agrees to warn all persons who may become exposed to such Raw Materials, by-products and/or the Product, while on Cedar's Plant, of any hazards indicated on said Sheets as being associated with such Raw Materials, by-products and/or the Product, and to comply with said Sheets. Except with respect to A&W's employees, Cedar shall indemnify and save harmless A&W from and against any and all losses, liability, damage and expense (including reasonable attorneys' fees) of every character whatsoever, for injuries, sickness, disease or death (including death resulting from such injuries, sickness and/or disease) sustained by any person, arising out of or resulting from Cedar's failure to warn any such persons and/or to comply with said Sheets.

13.2 Cedar agrees to hold A&W harmless from and to indemnify A&W against all loss, cost, damages, liability and expense (including reasonable attorney's fees) on account of death, personal injury or property damage that results from or is related to an occurrence involving Cedar's handling or storage of Raw Materials or Cedar's manufacture, handling or storage of the Product during periods when such Raw Materials or the Product are in Cedar's possession and control unless and to the extent such liabilities are caused by A&W's negligence provided that A&W's negligence shall not be a limitation as to matters related to OSHA as stated in Section 14.

13.3 A&W agrees to hold Cedar harmless from and to indemnify Cedar against all loss, costs, damages, liability and expense (including reasonable attorneys fees) on account of death, personal injury or property damage that results from or is related to occurrences involving the handling, storage, transportation, sale or use of Raw Materials delivered to Cedar hereunder and the Product produced by Cedar hereunder when such Raw Materials and Product are not in Cedar's possession and control, unless and to the extent caused by Cedar's negligence.

13.4 Neither party shall be liable to the other for any indirect, incidental or consequential damages, regardless of fault or concurrent negligence of the parties.

#### 14. COMPLIANCE WITH LAWS

Both parties shall fully comply with every federal, state and local law, ordinance, order, rule and regulation to which it is subject as a result of and to the extent required by their obligations hereunder including, without limitation, the Fair Labor Standards Act, as amended, and Executive Order No. 11246 (Equal Employment Opportunity) with all amendments thereto or as it may be superseded, and both parties agree that all the provisions of said Executive Order, as amended or superseded, are hereby made a part hereof by reference and are binding upon the parties. Both parties confirm that they have complied and they and their subcontractors and vendors will comply with the applicable provisions of said Executive Order and the rules and regulations promulgated under the authority thereof, including, among others, reporting requirements. Each party shall indemnify and save the other harmless from all costs, damages, fines, penalties, liabilities, losses and expenses the other party shall incur as a consequence of the violation of any law, ordinance, order, rule or regulation by the offending party; provided, however that compliance with occupational health and safety laws, regulations, rules, and orders as such relate to Cedar's plant shall be Cedar's sole liability and Cedar shall hold A&W harmless and indemnify A&W from any and all liabilities in connection

No liability shall result from non-performance or delay in performance caused by circumstances, including, without limitation, fire, flood, acts of God, strikes, riots, governmental action or inaction and the like, so long as the circumstance causing such delay or non-performance is beyond the control of the affected party; provided, however, that any party whose performance is prevented or impeded by such circumstances shall promptly provide written notice, with reasonable particulars, to the other party.

All notices required herein shall be deemed to be properly served if sent by first class mail with postage fully prepaid thereon, or by facsimile and addressed to the party for whom intended at the following addresses:

with a copy to:  
Albright & Wilson Americas  
2151 King Street Extension  
Charleston, SC 29405  
Attn: Jimmy Crawford  
Fax: (803) 740-5230

## 17. TERMINATION

17.1 Default - Anything elsewhere in this Agreement to the contrary notwithstanding, if a party breaches any of its obligations hereunder, including the obligation to regularly produce Product and By-Product meeting specifications, the non-defaulting party may terminate this Agreement effective thirty days following written notice to the defaulting party of such default, provided such default shall not have been cured by the

effective day of such notice. The provisions of Section 6.4 shall not apply if this Agreement is terminated due to Cedar's default.

17.2 A&W shall be entitled to terminate this Agreement without cause, by giving 30 days advance written notice; provided that A&W shall, within 30 days after termination, pay Cedar all sums due under Section 6 of this Agreement. During the sixty day termination period, A&W shall continue to supply Raw Materials in accordance with this Agreement in order to allow Cedar to perform its obligations.

#### 18. INDEPENDENT CONTRACTOR

Neither Cedar nor any employees of Cedar are employees of A&W, it being understood that Cedar is an independent contractor and is solely responsible for the employment, control and conduct of Cedar's employees.

#### 19. NO CLAIMS

As of the date of execution of this Agreement, each party represents and warrants that it knows of no claim against the other under any provision of this Agreement.

#### 20. GENERAL

The parties further agree as follows:

20.1 This Agreement shall be governed by the laws of the Commonwealth of Virginia without giving effect to its choice of law rules.

20.2 This Agreement constitutes the entire agreement between the parties with regard to the matters contained herein and there are no understandings or agreements, express or implied, not expressly set forth herein. No modification of this Agreement or waiver of any of its provisions shall be effective unless it is in writing and signed by the party to be bound thereby. Neither party's waiver of any breach of any of the provisions of this agreement shall be deemed to be a waiver of any subsequent breach of the same nature or any breach of a different nature. To the extent that either or both of the parties find it convenient to employ their normal forms of purchase order or acknowledgment of order in administering the terms of this Agreement, it or they may do so, but none of the terms and conditions printed or otherwise appearing on such form shall be applicable except to the extent that they reflect the quality, mode of shipment, or timing of deliveries.

20.3 This Agreement shall bind the successors and assigns of the parties hereto, but neither party may assign its interest in this Agreement without the prior written consent of the other party, which consent shall not be unreasonably withheld, provided, however, either party may assign its rights in this Agreement to a subsidiary of such party or to a purchaser of all or substantially all of such party's business or assets, or of the business or assets to which this Agreement relates.

20.4 All Exhibits referred to herein are deemed to be incorporated herein and made a part hereof. The section headings in this Agreement are inserted for convenience only and are not to be construed as part of this Agreement nor as a limitation of the scope of the particular sections to which they refer.

IN WITNESS WHEREOF, A&W and Cedar have caused this Agreement to be executed by their duly authorized representatives.

ALBRIGHT & WILSON AMERICAS INC. CEDAR CHEMICAL CORPORATION

BY Peter C. Hastings

BY [Signature]

TITLE Manager Business Development & Toll Manufacturing

TITLE Director of Custom Manufacturing

DATE January 5, 1993

DATE January 4, 1993



## EXHIBIT A

## RAW MATERIAL SPECIFICATIONS

<u>Material</u>	<u>Specification</u>
<u>ACETIC ACID GLACIAL</u>	
Assay (% wt.)	99.8 min.
Water (% wt.)	0.2
Chlorides (Cl)	4 ppm max.
Iron (Fe)	1 ppm max.
Color (APHA)	15 max.
<u>ACETIC ANHYDRIDE</u>	
Assay (% st.)	99.0 min.
Sp. Gr. @ 20/20	1.080 - 1.085
Color (Pt./Co.)	10 max.
<u>PHOSPHOROUS ACID FLAKE</u>	
Assay (% wt.)	98.5 min.
Phosphoric acid (% wt.)	1.0 max.
Chloride (ppm)	100 max.
Sulphate (ppm)	50 max.
Iron (ppm)	20 max.
Color, (APHA)	75 max.

## EXHIBIT B

PRODUCT SPECIFICATION  
BRIQUEST-ADPASPECIFICATIONS

		<u>TYPICAL</u>
Color (APHA)	<80	60
Actives Content (%)	60 + 2	60
pH of 1% solution	< 2.0	1.8
Phosphorous Acid (%)	< 4	1
Chlorides (%)	< 0.1	< 0.1
Iron (ppm)	< 35	<10

OTHER PROPERTIES

Appearance	Clear, colorless liquid
Odor	Slight
Typical SP.G. @ 20°C	1.46
Typical Viscosity @20°C (cP)	100
Molecular Weight	206

## EXHIBIT C

## RAW MATERIAL CONSUMPTION

<u>RAW MATERIAL</u>	<u>LB. R.M./BATCH</u>	<u>LB. R.M./LB. PROD</u>
Phosphorous Acid Flake	14,860	0.4849
Acetic Anhydride	21,308	0.6954
Steam (Sparge)	9,121	0.2977
D.I. Water	10,906	0.3559
Carbon	153	0.0005
ADPA Product	30,643	1.0000

## EXHIBIT D

## BY-PRODUCT GENERATION AND SPECIFICATIONS

<u>RAW MATERIAL</u>	<u>LB. R.M./BATCH</u>	<u>LB. R.M./LB. PROD</u>
Acetic Acid (80%)	23,903	0.7800
Waste Water	1,633	0.0533
Solids	15	0.0005
Spent Carbon	153	0.0050

# ALBRIGHT & WILSON Americas

P.O. Box 26229, Richmond, Virginia 23260-6229

Telephone (804) 550-4300

FAX (804) 550-4385

## EXHIBIT E

November 30, 1992

To: David Hoppel  
Cedar Chemical

Dear Dave:

The purpose of this letter is to summarize the discussions we had on November 23, 1992 at your site, and previously by telephone and meetings. Our discussions have concentrated mainly on the safety considerations of ADPA manufacture to ensure that there is a common understanding of the factors which Albright and Wilson has found necessary to safely produce high quality ADPA internally and, perhaps, which will assist Cedar in making appropriate decisions relative to the upcoming campaign at your site. All process information described here and any such information conveyed in the subject calls and meetings I mentioned are covered under our Secrecy Agreement.

The main points we covered are:

- 1 The Albright and Wilson process description for producing ADPA which I provided earlier and is attached for reference is a general description which was developed without specific knowledge of Cedar's equipment or safety systems. Some parts of the process will have to be adapted to fit with your plant. Examples of items that will have to be adapted include the time to pump materials, distillation and stripping times, and the addition rate of acetic anhydride.
- 2 The addition rate of acetic anhydride is important. When acetic anhydride is added to phosphorous acid two reactions take place in sequence. The first half of the acetic anhydride added reacts with the phosphorous acid in a mildly exothermic reaction to form, we believe, pyrophosphorous acid and acetic acid. The second half of the anhydride addition reacts with the pyrophosphorous acid in a very exothermic reaction to form ADPA intermediate and acetic acid. The heat of reaction is removed by refluxing the acetic acid. The following should be considered when Cedar specifies the addition rate and designs controls, emergency devices, etc.:
  - The measured heat of reaction for the entire acetic anhydride addition is 14 Kcal per g mole of anhydride. Albright and Wilson prefers a conservative case which assumes all of this heat is liberated during the second half of the addition, effectively doubling the heat rate per mole for the second half.



ALBRIGHT & WILSON AMERICAS INC.  
A Tenneco Company

- The unexpected loss of cooling water or the loss of reflux flow are significant problems which could cause overheating and/or overpressure. Also, since acetic acid freezes at 16 C, it is possible to freeze it in the condenser and lose reflux cooling if the cooling water is too cold.
  - Another significant situation we plan to avoid at our plant is the addition of anhydride at a rate higher than planned or when it is unexpected. We discussed Albright and Wilson's plans which included such things as a limiting orifice in the line and either disconnecting the line when not in use or closing additional valves.
  - We believe that the anhydride reacts rapidly, so, if the proper temperature and agitation are maintained, there should be little residual reaction after anhydride flow is stopped. This information is based on observation only, and we do not have precise data.
  - We specify an addition rate, and suggest you consider doing this as well, so that the overhead condenser can remove all of the heat with a suitable reserve to deal with variations in anhydride flow, water flow, upsets, etc. Also, when there is spare condenser area, the condensate will be cooled below the condensing temperature by the extra surface area. This degree of cooling could be useful in monitoring the process.
  - The rupture disk on the reactor is the last backup safety system. Albright and Wilson designs our disk systems to protect our reactors from over pressure in an emergency. Factors, such as flow rates, cooling systems, instrumentation, and other emergency systems will determine the proper sizing for the rupture disk system. Thus, the disk system should be considered when designing the other safety systems for the ADPA process.
  - Acetic anhydride is very reactive with water. Care should be taken to insure that the acetic anhydride line is dry and that water can not be put in it. The line should not be blown back to the acetic anhydride car to empty it. Another situation to avoid is getting water in the first reactor or in the premix of phosphorous acid and acetic acid. It will react preferentially with the acetic anhydride and generate more heat than the reaction with phosphorous acid.
- 3 When the slurry of phosphorous acid is made in the acetic acid, it is possible that the resulting slurry will be too thick to stir. Cedar can use more acetic if needed, or wait until the reactor is heated and more of the phosphorous acid goes into solution.
- 4 The reactor described in Item 3 will contain acetic acid and have an atmosphere of air while charging the phosphorous acid. The flash point of acetic acid is just over 40 C, so the reactor should be maintained below this until the atmosphere can be inerted. Since acetic acid freezes at 16 C, we prefer a temperature range for this step versus the single 25 C target initially chosen. We discussed 22 - 28 C, but I do not recall if you came to decision on this. I provided you with a three component diagram from Hoechst which gives the flammability limits of acetic acid, oxygen and nitrogen at 160 C. We believe this should give a conservative case for inerting. The original procedure estimated 5 % oxygen as a target. This Hoechst data shows that 4% oxygen is outside the flammability envelope for all concentrations of acetic acid.

- 5 To avoid possible corrosion problems on the glass of the above reactor, the glass temperature should be as low as reasonably possible. One way to achieve this is to heat the reactor with low pressure steam instead of high pressure. Also, care should be used in any step where phosphorous acid is heated in process equipment. It is generally understood in the industry that if phosphorous acid exceeds 150 C a decomposition occurs, producing toxic byproducts including phosphine. If the decomposition is significant there can be an ignition of the gases.
- 6 We did our process work at 180 minutes for the age step after acetic anhydride addition and recommend Cedar start up using that time period. After Cedar starts up and gets lined out, there may be an ability for Cedar to reduce the age step down from 180 minutes. The key variable which would allow this is the ability to achieve the proper residual phosphorous acid in the intermediate.
- 7 On the acetic acid strip, our target temperature has been 140 C. There are three things you should consider when planning how to control this temperature or before deciding to change this target temperature. First, more glacial acetic is removed as we allow the temperature to rise, but the amount diminishes rapidly as the temperature increases at the end of the strip. Second, the viscosity of the solution increases towards the end of the strip. Finally, ARC testing showed that a decomposition occurs at 175.5 C and that a maximum self heat rise of .776 deg C / min. occurs resulting in a final adiabatic temp of 622.5 C.
- 8 The viscosity of ADPA solutions increases as the solvent (either acetic acid or water) is removed. While we do not expect that the acetic acid stripping step will result in a high viscosity in the reactor, we believe it is possible. In our plant we plan to monitor the agitator motor or the circulating pump motor to give an early warning. A small amount of water or steam will reduce the viscosity.
- 9 There is more potential to create a high viscosity in the steam sparge step when we use the external heat exchanger. With steam stripping alone, enough water condenses to more than compensate for the acetic acid removed. However, steam stripping alone is inefficient. It takes a long time and produces a dilute coproduct acetic acid. The external heat exchanger will solve these problems but can reduce the water dissolved in the ADPA to a point that the viscosity goes up. Thus, some water will likely have to be added to the reactor while using the external heat exchanger in order to maintain fluidity and keep the reactor temperature from going over your set point. There are several ways this could be done including using the reactor temperature to control the water addition rate. I will work you to help with the calculations if you like. The approach we plan to use on our plant is to start up with steam sparge alone and just circulate through the external heater without any steam on it. Steam heat on the external exchanger will then be added later after we are comfortable with the rest of the process. You indicated that this sounded like a good approach for Cedar as well.
- 10 It may be more efficient to inert the reactors by pulling vacuum and breaking with nitrogen versus the procedure of repeatedly pressuring with nitrogen and bleeding down.

Please let me know if you have any questions or comments.

Sincerely,

A handwritten signature in cursive script, appearing to read "H. G. Jennings".

H. G. Jennings



## PROPOSED ADPA PROCESS FOR CEDAR

- 1 Add 4375 lb (500 gal) glacial acetic acid to reactor 1 from storage. Maintain at 25 C. Agitate.
- 2 Dump 13151 lb phosphorus acid from kegs (100 60 kilo kegs) into reactor 1 while maintaining temp at 25 C. (flash point of acetic acid is about 40 C.) Reactor will need to be vented to caustic scrubber to keep acetic vapors from coming out of manway while dumping.
- 3 Close reactor 1. Evacuate / purge with N2 to get O2 level below 5%. (exact level TBD)
- 4 Heat reactor 1 to 80 C and agitate for 1 hour. This insures its all in solution.
- 5 Heat to 100 - 110 C. Add 18,857 lb (2091 gal) acetic anhydride evenly over 2 hours. Reactor will heat to 120 C and acetic acid will begin to boil. Allow mix to reflux for the rest of the anhydride addition. It is the primary cooling for the reaction. The anhydride reacts in two steps. The first half of the addition is mildly exothermic, the second is much more exothermic. The refluxing acetic is essential for cooling. Note that acetic freezes at 16 C so the cooling water supply must always be warmer than this.
- 6 Heat reactor to maintain reflux and age for 3 hours after anhydride addition complete.
- 7 Cool to 80 C, then add 1533 lb ( 1030 gal ) water to reactor and age 30 min.
- 8 Add 4 lb of coarse powdered carbon to reactor 2.
- 9 Transfer contents of reactor 1 to reactor 2 and begin again with step 1 for reactor 1.
- 10 Heat reactor 2 with steam and strip acetic acid off. Allow pot temperature to rise to 140 C. About 18,900 lb of acetic should come off during the strip. Save the first 4375 lb in a receiver or tank to be used for step 1 of the next batch. Collect the remainder in a large receiver or mix vessel. Need about 80 psi steam on the jacket for this to proceed at a reasonable rate. An external heater would help but is not essential.
- 11 With steam still on the jacket, begin sparging steam into the reactor at 1800 lb/hour through two stainless spargers (900 each). (It may be difficult to get this rate - we can do with less but it will affect batch time). Maintain 140 C max. The acetic acid / water distillate should be collected

in the receiver or mix tank along with the glacial acid from the above step until the tank contents reach 80% acetic (there should be about 21,200 total lbs) The receiver should then be transferred to storage and the rest of the distillate should be put in aqueous waste. The acetic content of the distillate will be very low by this time (a few percent). Continue until the specified amount of distillate is taken off. Will be able to do the distillate cuts by volume collected after the first few batches. For the first few, will have to analyze the distillate and receiver for % acetic. The volumes can be predicted fairly well when we know the heat transfer characteristics of the vessel and the exact steam sparge rate.

- 12 Cool to 100 C, add 4500 lb DI water and agitate. Sample for activity and adjust if needed. Again, will need experience to know exactly how much DI water to add initially.
- 13 Pump reactor 2 contents through a bag filter to remove the powdered carbon and send to storage. Final product should be 26,700 lb.

This description is for using two 4000 gal reactors. This would give a rate of 25 to 45 K lbs/day depending on heat transfer rates, and phosphorus acid addition rates. The process could be run in one reactor but the rate would be low.

Reactors must be glass lined. All receivers and tanks should be at least ss.

The minimum storage needed on site is: ADPA (25 K gal), 80% Acetic (10 K gal), acetic anhydride (10 K gal), 100% glacial acetic acid (2 K gal). Covered storage is needed for about 1000 kegs. Kegs can not be opened ahead of time because material is very hygroscopic and water will chew up the acetic anhydride.

We plan to send the 80% acetic to a distributor with bulk storage. We also plan on off site storage for ADPA, but some will be shipped directly to customers. More storage for ADPA and / or acetic would be a plus.

Rough times per step are:

Step	Reactor 1	Reactor 2
------	-----------	-----------

1	0.5 hr	
---	--------	--

2	5.0	
---	-----	--

3	1.0	
---	-----	--

4	2.0	
---	-----	--

5	2.5	
---	-----	--

6	3.0	
---	-----	--

7	2.0	
---	-----	--

8		0.5
---	--	-----

9		0.5
---	--	-----

10		6.0
----	--	-----

11	5 - 10	(depending on steam sparge rate and heat input through the jacket)
----	--------	--

12	2.0	
----	-----	--

13	1.0	
----	-----	--

Tot	16 hr	
-----	-------	--

		15 - 20 hr
--	--	------------

Date Happened 1/25/23

Extra page for  
Exhibit D, ADPA  
Contract



Neil

**ALBRIGHT &  
WILSON Americas**100 Lakeridge Parkway  
Ashland VA 23005  
Tel. (804) 550-4300**CERTIFICATE OF ANALYSIS**

---

**MATERIAL:**  
80% Acetic Acid**ATTENTION:**Report Date:  
Sample Lot Number(s): N/A  
Quantity Shipped: N/AShipping Date:  
A&W Order Number: N/A  
Customer Order Number: N/A

ANALYSIS:	<u>Method</u>	<u>Typical Result</u>	<u>Specification</u>	
			<u>Min</u>	<u>Max</u>
Assay, %	ACE-1	80.7	78.0	82.0
Chloride, ppm	ACE-2	2.6	-	10
Iron, ppm	ACE-3	<1	-	10
Color, APHA	ACE-4	<25	-	25

---

Chemist

Consultation and copies of Analytical Methods are available by contacting Technical Service, Richmond, Virginia, (804) 550-4300.

Neil

For December's revenue, assume  
4 days at \$8,000 per day for A + W

Thanks  
DVA  
12/28

*Dave Hoppel* → *WNR*  
*Final form (I hope)*  
*DH*

**ALBRIGHT & WILSON**  
**Americas**

P.O. Box 26229, Richmond, Virginia 23260-6229  
Telephone (804) 550-4300  
FAX (804) 550-4385

December 18, 1992

Mr. Geoffrey L. Pratt  
Cedar Chemical Corporation  
24th Floor  
5100 Poplar Avenue  
Memphis, TN 38137

FEDERAL EXPRESS

Dear Geoff:

I enclose duplicate original agreements which have been approved for signature by Allen Malone. Once signed, please return them to me and I will have them signed.

By copy of this letter, I am asking Grey Jennings to see that you have a process description to attach to the agreement.

If you have any questions, please call me at your convenience.

Sincerely,

*Deborah K. Newell*

Deborah K. Newell  
Legal Counsel

DKN/sb

Enclosure

cc: Peter C. Hastings  
Grey Jennings  
Allen T. Malone, Esq.



ALBRIGHT & WILSON AMERICAS INC.  
A Tenneco Company

albright + Wilson